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'Author and Authorship' in Scientific Journals

Jay N Shah
Editor In Chief, Journal of Patan Academy of Health Sciences

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Extracorporeal Shock Wave Lithotripsy in Management of Urolithiasis

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3 Junior Consultant Surgeon
Department of Surgery, Shree Birendra Hospital and Nepalese Army Institute of Health Sciences, Kathmandu, Nepal

ABSTRACT

Introduction: Since 1980, when Chaussy in West Germany first demonstrated the efficacy of Dornier prototype lithotripsy HM1, extracorporeal shock wave lithotripsy has become a convenient, noninvasive, outpatient procedure used to fragment urinary stones. It is a standard internationally accepted first line preferred option for the management of renal stone less than 2.5 cm size.

Methods: A cross sectional study was conducted in the department of surgery of Shree Birendra Hospital on outpatient department basis during the period of March 2002 to February 2012. All consecutive patients presenting with renal and upper ureteric stones detected either on X-ray or ultrasound of the Kidney-Ureter-Bladder who were treated with extra corporeal shock wave lithotripsy. Descriptive analysis included age, sex, stone location, need of total session, use of double J stent and complications.

Results: Total 710 diagnosed cases of urolithiasis were taken for the study. The youngest age was 16 years and oldest 69 years of age. Overall stone clearance rate was 73.52%. The stone free rate for upper, middle, and lower calyx were 85.94%, 90.20% and 50.52% respectively.

Conclusions: Extracorporeal shock wave lithotripsy was successful in the management of the stones smaller than 2.5 cm in all caliceal locations and minimal morbidity.

Keywords: ESWL, steinstrasse, urolithiasis

Plain Language Summary

ESWL with new generation Lithotripter was safe and effective in adult out patients with urolithiasis less than 2.5 cm in functioning kidney without distal obstruction or urine infection. Stone clearance was 70%. DJ stenting was done in stone larger than 2 cm.
INTRODUCTIONS

Since 1980, when Chaussy in West Germany first demonstrated the efficacy of Dornier prototype lithotripsy HM1, shock wave lithotripsy (SWL) has become a convenient, noninvasive, outpatient procedure used to fragment most urinary stones.1 It is a standard internationally accepted first line preferred option for the management of renal stone less than 2.5 cm size.2 After the introduction of the original electro-hydraulic Dornier HM-3 and its high power delivery, lithotripters have been developed with new sources for generation of shock waves, such as electromagnetic and piezoelectric sources.3

Beside Extracorporeal Shockwave Lithotripsy (ESWL), other minimally invasive surgical options revolutionized the treatment of urolithiasis and now open surgery is performed only in cases of contraindication or where facility is not available. Shree Birendra Hospital (SBH), Kathmandu Nepal introduced ESWL in 1987.

Various studies have been published regarding the outcome of ESWL, but there is lack of data from local institutes in Nepal where the prevalence of urolithiasis is still high.

METHODS

This was a cross sectional study conducted in the Department of Surgery of SBH, the teaching hospital of Nepalese Army Institute of Health Sciences (NAIHS), during the period of March 2002 to February 2012. All consecutive patients older than 16 years of age, presenting with renal and upper ureteric stones who underwent ESWL on outpatient department (OPD) basis were included in the study. All patients were evaluated with complete haemogram, coagulation tests, blood urea, serum creatinine, urine for routine and culture sensitivity, X-ray KUB and ultrasound abdomen - pelvis and intravenous urogram (IVU) or computerize tomography (CT) scan before subjecting them to shock wave treatment. Patient with renal an upper ureteric stones more than 5 mm and less than 2.5 cm, with normal renal function in non obstructed kidney were included in this study. The size of the stone was calculated by ultrasound and X-ray in all cases. Patient with active urinary tract infection, renal failure, uncorrected distal obstruction, gross hydronephrosis, pregnancy, abdominal and renal artery aneurysm, coagulation disorder, obesity and cardiac problem were excluded from the study. Patients who developed complication during study period or refused to complete study were also excluded from study. Data was analyzed age, sex, stone location, need of total session, use of double J stent (DJ stent) and any complication. Approval for study was taken from hospital authority.

ESWL was performed in all patients with the Edap Technomed Sonolith Parktis Version lithotripter. Stones were localized using fluoroscope and ultrasonography. All patients were treated in supine position. The stones treated were predominantly radio opaque. Patients did not undergo any special bowel preparation prior to the procedure except for overnight fast. A double J stent was placed in patients with stone size greater than 2 cm before subjecting to ESWL. Treatment was initiated with 14 kV and adjusted from 11 to 22 kV depending on the tolerance of the patient, location of the stone and the nature of the stone. Maximum of 3000 shocks were delivered in one.

All patients received Ciprofloxacin 500 mg twice a day andDiclofenac 50 mg thrice a day following the procedure for a period of 5 days. Patients were followed every month for a period of three months to make a final evaluation. Successful results were defined as complete stone clearance by ultrasound or KUB X-ray at three months.

RESULTS

Total 710 diagnosed cases of urolithiasis (renal and upper ureteric stone) were included in the study. The youngest was 16 years and oldest 69 years of age. The size of stone ranged from 5.6 mm to 23 mm. Overall stone clearance rate was 73.52% (522 out of 710).

Table 1. Characteristic of stones in 710 (M: 380, F: 330) urolithiasis patients who underwent ESWL

| 1 | Mean age of the patients | 41.5 years |
| 2 | No. of Male patients | 380 (53.52%) |
| 3 | No. of Female patients | 330 (46.47%) |
| 4 | Maximum no. of stones size (10-15mm size) | 411 (57.88%) |
| 5 | No. of cases with single stone | 467 (65.77%) |
| 6 | No. of cases with multiple stones | 243 (34.22%) |
| 7 | Patient with right side stone | 364 (51.26%) |
| 8 | Patient with left side stone | 346 (48.74%) |

Regarding the location of the stone and stone free rate for upper, middle and lower calyces were 85.94%, 90.20% and 50.52% respectively. The stone free rate for the bilateral kidney, PUJ stone and upper ureter was 68.42%, 61.29% and 53.85% respectively. Stone free rate in a single session was 75.67%, 71.13% and 30.2% of patients in the upper, middle and lower caliceal system respectively.
Our lithotripsy, Sonolith Practice of Edap Technomed features an electro hydraulic generator, which incorporates a conductive medium in which sparks are created. The electrode itself is located within the ellipsoidal reflector, which has been designed to reduce pain without compromising efficacy. Voltage may be continuously set from 10 to 22 KV. Coupling between patient and water is assured by a membrane covered with ultrason conductive gel. The lithotripsy has a double localization system. The major advantage of second generation lithotripter is anaesthesia free shock wave lithotripsy treatment.

In theory, extracorporeal lithotripsy is based on the fragmentation of urinary stones into smaller fragments (that can pass spontaneously through the ureter) by shockwaves generated outside the body and focally transmitted to the stone. Fragmentation is achieved by direct shearing force, erosion or cavitations. Shockwaves pass through the tissues with virtually no loss of strength, but at the liquid-stone interface they induce a powerful energy discharge due to the high variation of density and small impact surface.

Lithotripters have four basic components: shockwave generation system, focialization system, coupling mechanism and stone localization system. The shockwaves can be generated in three different ways: electro-hydraulic, spark-gap or electromagnetic. Third generation electromagnetic lithotripters provide a wide range of improvements such as high shockwave accuracy that in turn allows the procedure to be performed with little or no analgesia as well as electromagnetic shockwave stability (due to the cylindrical source), wide wave energy range and the possibility of continuous therapy supervision and energy adjustment.

Extracorporeal lithotripsy treatment outcome depends on several factors which include the type of lithotripter, stone (size, location, composition and number), the anatomy and kidney function. Stones larger than 15 mm and calcium oxalate monohydrate usually require several sessions of ESWL for clearance. Uric acid, calcium oxalate dihydrate as well as struvite stones are easier disintegrate. ESWL has better result with stone in upper and middle pole of the kidney, but poor outcome for stones located in the lower pole (stone free rate is 40-70%).

Some of the studies have questioned the use of lithotripsy in lower pole kidney stone, but many have suggested as a primary treatment modality for the stone size less than 2 cm.

For the optimum treatment, a good patient assistance is required without analgesia. This is even more important

### Table 2. Location of stone and stone clearance rate

<table>
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<tr>
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<th>Total stone clearance no (n=522)</th>
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<tr>
<td>1</td>
<td>Upper calyx</td>
<td>185 (26%)</td>
<td>159 (85.94%)</td>
</tr>
<tr>
<td>2</td>
<td>Middle calyx</td>
<td>194 (27.32%)</td>
<td>175 (90.20%)</td>
</tr>
<tr>
<td>3</td>
<td>Lower calyx</td>
<td>192 (27.04%)</td>
<td>97 (50.52%)</td>
</tr>
<tr>
<td>4</td>
<td>PUJ</td>
<td>31 (4.3%)</td>
<td>19 (61.29%)</td>
</tr>
<tr>
<td>5</td>
<td>Upper ureter</td>
<td>13 (1.83%)</td>
<td>7 (53.84%)</td>
</tr>
<tr>
<td>6</td>
<td>Bilateral</td>
<td>95 (13.38%)</td>
<td>65 (68.42%)</td>
</tr>
<tr>
<td>7</td>
<td>Total</td>
<td>710</td>
<td>522 (73.52%)</td>
</tr>
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Out of 710 only 37 (5.21%) patients with stones size more than 2 cm had DJ stent before ESWL.

### Table 3. Outcome of the study

| 1 | Mean no. of shock wave and energy | 2345 and 16.3kV |
| 2 | Total no of stone clearance in 1st session | 403 (56.76%) |
| 3 | Spontaneously stone passage noted within 24 hours | 431 (60.70%) |
| 4 | Mean duration of procedure | 43.5 minutes |
| 5 | Total no. of patient with major complication (Steinstrasse) | 51 (7.1%) |
| 6 | No. of cases needed DJ stent before procedure | 37 (5.21%) |

Skin bruise, nausea, minor pain and early haematuria were noted in most of the cases. Steinstrasse with colicky developed in 51 (7.1%) patients, of which 31 needed DJ stent and ureteroscopic intervention. The surgical treatment after failure included pyelolithotomy and ureteroscopy with intracorporeal lithotripsy.

### DISCUSSIONS

The management of urinary stone disease has changed with the advances in technology. Until the introduction of minimally invasive treatments, the majority of the urinary stones with no spontaneous passage were usually managed by open surgery. Nowadays the rate of open surgical procedures for the urinary stone disease is below 5%. Modern therapies such as ESWL, Ureteroscopy, Percutaneous Nephrolithotomy (PCNL) and Retrograde Intra Renal Surgery (RIRS) have replaced open procedures and open surgery is performed only in cases of failure and contraindication for minimal invasive methods.

ESWL treatment for urolithiasis started on February 7, 1980 in Munich using a Dornier HM-1 lithotripter (the device was designed by the aero-spatial company Dornier and was initially intended for testing supersonic planes components). Stone localization can be done by ultrasound and X-ray fluoroscopy. Newer lithotripters have a double guiding system (ultrasound and X-ray). Extracorporeal shock wave lithotripsy has gradually become the first line of treatment for upper urinary tract stones diseases worldwide. It is the least invasive procedure compared to other methods and has achieved 70-90% success rate.

European treatment guidelines recommends ESWL treatment for all stones larger than 5 mm.

Extracorporeal lithotripsy treatment outcome depends on several factors which include the type of lithotripter, stone (size, location, composition and number), the anatomy and kidney function. Stones larger than 15 mm and calcium oxalate monohydrate usually require several sessions of ESWL for clearance. Uric acid, calcium oxalate dihydrate as well as struvite stones are easier disintegrate. ESWL has better result with stone in upper and middle pole of the kidney, but poor outcome for stones located in the lower pole (stone free rate is 40-70%). Some of the studies have questioned the use of lithotripsy in lower pole kidney stone, but many have suggested as a primary treatment modality for the stone size less than 2 cm.

For the optimum treatment, a good patient assistance is required without analgesia. This is even more important
after the procedure when the patient compliance with the medical recommendations is expected (fluid intake, medication, scheduled follow-up).

The overall stone free rate in our study was 73.52% (in 522 patients). The stone free rate for upper, middle, and lower calyx was 85.94%, 90.20% and 50.52% respectively. The stone free rate for the bilateral kidney, PUJ stone and upper ureter was 68.42%, 61.29% and 53.85% respectively. This result is comparable to most of the study published in the literature.

Auxiliary procedures were used before treatment in some patients which included DJ stent placed in patient with stones size more than 2 cm. Only 37 (5.21%) patients needed DJ stent before the procedure. The stone clearance rate is 56.75% (21) in stone size more than 2 cm in this study. The maximum numbers of stone size were 10 to 15 mm (57.88%), where the stone clearance rate was 76.15%.

Our patient did not have any serious complications such as perirenal hematoma or urosepsis. Most case of Steinstrasse were treated with analgesics, antibiotics and antispasmodics and extra water consumption with favorable outcome but a few cases required ureteroscopic removal of stone (URS) and double J stent placement. Minor post procedural complication noticed in majority of the cases was haematuria which was insignificant and rarely lasted for more than 24 hours. Other minor complications observed were skin bruise, nausea and colicky pain, very similar to other studies.

**CONCLUSIONS**

Extracorporeal shock wave lithotripsy is successful in the management of the kidney stones smaller than 2.5 cm in all caliceal locations and is safe modality with minimal morbidity with better stone clearance for upper and middle calyx.

**REFERENCES**

Comparative Study of Tweed Triangle in Angle Class II Division I Malocclusion between Nepalese and Chinese Students

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2Professor, Department of Orthodontics, Dalian Medical University, Dalian, China
3Associate Professor, Department of Orthodontics, B. P Koirala Institute of Health Sciences, Dharan, Nepal

ABSTRACT

Introductions: The establishment of specific cephalometric norms for specific race or ethnic group has been documented in literatures. The aim of the present study was to compare the Tweed triangle for Nepalese and Chinese subjects with Angle Class II division 1 malocclusion.

Methods: The cephalometric radiographs of 52 Nepalese and 52 Chinese students age between 14 to 18 years, Class II division 1 malocclusion with Point A-Nasion-Point B angle larger than 4 degrees were analyzed for 9 parameters.

Results: Mean age of Nepalese participants was 14.28 years and that of Chinese 14.09. The comparative variables of Nepalese and Chinese population were: Y axis (61.39 and 67.52), Sella Nasion Point A angle (83.69 and 81.14), Sella Nasion Point B angle (76.87 and 74.62), Occlusal plane angle (19.0 and 23.12), Frankfort Mandibular plane angle (28.13 and 32.87) and Lower Incisor to Frankfort Horizontal plane Angle (54.77 and 48.23).

Conclusions: The Class II skeletal pattern, well positioned maxillas and retrusive mandibles were present in both samples. The Chinese showed more protruded maxilla, more buccal inclination of lower incisors and longer face than Nepalese.

Keywords: Angle class II division 1, cephalometry, tweed triangle

Plain Language Summary

The study was done to identify the Tweed triangle for a sample of Nepalese and Chinese subjects with Angle Class II division 1 malocclusion. The study found that the both samples showed Class II skeletal pattern, well positioned maxillas and retrusive mandibles but the Chinese had more protruded maxilla, more buccal inclination of lower incisors and longer face than Nepalese. It showed the importance of ethnic role as Nepalese have distinct cephalometric features, which should be used as a reference while treating the Nepalese orthodontic patients.
INTRODUCTIONS

Angle Class II Division 1 malocclusion is characterized by a distal relation of the lower teeth to the upper. The extension of lower teeth being more than one-half the width of one cusp and the protusive maxillary incisors. This can be related to a retrognathic mandible, prognathic maxilla, or a combination of both. The most common characteristics are the retrognathic mandible, maxillary prognathism and reduced vertical skeletal jaw relationship.

Tweed analysis consists of the Tweed triangle formed by ‘Frankfort horizontal plane, the mandibular plane and the long axis of lower incisor’. In 1954 Tweed stated that “The lower incisor to Frankfort horizontal plane angle (FMIA) of 65 degrees works beautifully but occasional patients require 75 degrees.”

The purpose of the present study was to compare Tweed triangle of Nepalese and Chinese subjects with Angle Class II division 1 malocclusion.

METHODS

This cross-sectional descriptive study was done in the Department of Orthodontics, B.P. Koirala Institute of Health Sciences, Nepal and the Department of Orthodontics, Dalian Medical University, China. The purposive sampling done with standardized lateral cephalometric radiographs of 52 Nepalese and 52 Chinese students with equal number of male and female in both groups (Male=26 and Female=26). Written consent was obtained from all participants after explaining the nature and purpose of the radiograph.

The inclusion criteria were natural-born ethnic Nepalese and Chinese, age 12 to 18 years. Angle class II division 1 malocclusion, A-Nasion-Point B (ANB) angle larger than 4 degrees, no craniofacial deformities, no previous orthodontic treatment or maxillofacial surgery or plastic surgery.

The descriptive analysis and independent student t-test were performed using Statistical Package for the Social Sciences (SPSS version 11.5). Results were considered to be statistically significant when p≤0.05.

Different points and angles described in figure are as follows:

A (Point A); ANB (Point A-Nasion-Point B Angle); B (Point B); FH (Frankfort Horizontal Plane); FMA (Frankfort Mandibular plane angle); FMIA (Lower incisor to Frankfort horizontal plane angle); Gn (Gnathion); IMPA (Lower incisor to mandibular plane angle); Ls (Labrale superius); MP (Mandibular plane); N (Nasion); NA (Nasion-Point A plane); NB (Nasion-Point B plane); OP (Occlusal plane); OP-SN (Occlusal Plane Angle); Or (Orbitale); Pg1 (Soft tissue pogonion); Po (Porion); S (Sella); SN (Sella-Nasion plane); SNA (Sella-Nasion-Point A Angle); SNB (Sella-Nasion - Point B Angle)

RESULTS

All subjects participating in the study were students. Mean age of Nepalese participants was 14.28 years and that of Chinese participants was 14.09. Craniofacial features on cephalometric parameters between Nepalese and Chinese population (Table-1) and cephalometric parameters for Nepalese and Chinese Male (Table-2) and female (Table-3) were compared. The gender difference in FMIA angle amongst Chinese population was not statistically significant. (Table 4) (Table-5).
Table 1. Comparison of mean values between Nepalese and Chinese subjects with Class II division 1 malocclusion

<table>
<thead>
<tr>
<th>Variables</th>
<th>Nepalese (n=52)</th>
<th>Chinese (n=52)</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-axis</td>
<td>61.39</td>
<td>67.52</td>
<td>6.776</td>
<td>.000*</td>
</tr>
<tr>
<td>SNA Angle</td>
<td>83.69</td>
<td>81.14</td>
<td>3.637</td>
<td>.003*</td>
</tr>
<tr>
<td>SNB Angle</td>
<td>76.87</td>
<td>74.62</td>
<td>2.978</td>
<td>.005*</td>
</tr>
<tr>
<td>ANB Angle</td>
<td>6.83</td>
<td>6.53</td>
<td>1.946</td>
<td>.065</td>
</tr>
<tr>
<td>OP-SN</td>
<td>19.00</td>
<td>23.12</td>
<td>3.481</td>
<td>.001*</td>
</tr>
<tr>
<td>FMA</td>
<td>28.13</td>
<td>32.87</td>
<td>2.560</td>
<td>.012*</td>
</tr>
<tr>
<td>FMIA</td>
<td>54.77</td>
<td>50.92</td>
<td>2.118</td>
<td>.035</td>
</tr>
<tr>
<td>IMPA</td>
<td>99.98</td>
<td>98.96</td>
<td>1.090</td>
<td>.281</td>
</tr>
<tr>
<td>Z Angle</td>
<td>61.94</td>
<td>63.08</td>
<td>1.017</td>
<td>.311</td>
</tr>
</tbody>
</table>

Table 2. Comparison of mean values between Nepalese and Chinese Male subjects with Class II division 1 malocclusion

<table>
<thead>
<tr>
<th>Variables</th>
<th>Nepalese Males (n=26)</th>
<th>Chinese Males (n=26)</th>
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<th>P</th>
</tr>
</thead>
<tbody>
<tr>
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<td>68.85</td>
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</tr>
<tr>
<td>SNA Angle</td>
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<td>80.94</td>
<td>2.036</td>
<td>.047*</td>
</tr>
<tr>
<td>SNB Angle</td>
<td>76.88</td>
<td>74.62</td>
<td>1.818</td>
<td>.075</td>
</tr>
<tr>
<td>ANB Angle</td>
<td>7.00</td>
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<td>.281</td>
</tr>
<tr>
<td>OP-SN</td>
<td>20.69</td>
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<td>-1.936</td>
<td>.059</td>
</tr>
<tr>
<td>FMA</td>
<td>29.50</td>
<td>35.42</td>
<td>-1.920</td>
<td>.061</td>
</tr>
<tr>
<td>FMIA</td>
<td>58.62</td>
<td>53.59</td>
<td>1.370</td>
<td>.001*</td>
</tr>
<tr>
<td>IMPA</td>
<td>97.65</td>
<td>97.73</td>
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<td>.981</td>
</tr>
<tr>
<td>Z Angle</td>
<td>61.77</td>
<td>62.15</td>
<td>-0.301</td>
<td>.765</td>
</tr>
</tbody>
</table>

Table 3. Comparison of mean values between Nepalese and Chinese female subjects with Class II division 1 malocclusion

<table>
<thead>
<tr>
<th>Variables</th>
<th>Nepalese Females (n=26)</th>
<th>Chinese Females (n=26)</th>
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<th>P</th>
</tr>
</thead>
<tbody>
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<td>66.19</td>
<td>-2.964</td>
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</tr>
<tr>
<td>SNA Angle</td>
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<td>81.35</td>
<td>2.460</td>
<td>.017*</td>
</tr>
<tr>
<td>SNB Angle</td>
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<td>74.62</td>
<td>2.338</td>
<td>.023*</td>
</tr>
<tr>
<td>ANB Angle</td>
<td>6.65</td>
<td>6.73</td>
<td>-1.117</td>
<td>.907</td>
</tr>
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<td>OP-SN</td>
<td>17.31</td>
<td>21.88</td>
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<td>.001*</td>
</tr>
<tr>
<td>FMA</td>
<td>26.77</td>
<td>30.31</td>
<td>-1.831</td>
<td>.073</td>
</tr>
<tr>
<td>FMIA</td>
<td>50.92</td>
<td>49.58</td>
<td>0.625</td>
<td>.535</td>
</tr>
<tr>
<td>IMPA</td>
<td>102.31</td>
<td>100.19</td>
<td>1.475</td>
<td>.147</td>
</tr>
<tr>
<td>Z Angle</td>
<td>62.12</td>
<td>64.00</td>
<td>-1.027</td>
<td>.309</td>
</tr>
</tbody>
</table>

Table 4. Comparison of hard and soft tissue mean values between Nepalese genders with Class II division 1 malocclusion

<table>
<thead>
<tr>
<th>Variables</th>
<th>Nepalese Males (n=26)</th>
<th>Nepalese Females (n=26)</th>
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<th>P</th>
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<tbody>
<tr>
<td>Y-axis</td>
<td>61.13</td>
<td>61.65</td>
<td>-1.831</td>
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<td>SNA Angle</td>
<td>83.88</td>
<td>83.50</td>
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<td>SNB Angle</td>
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<td>74.62</td>
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<tr>
<td>ANB Angle</td>
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<td>FMA</td>
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<td>.235</td>
</tr>
<tr>
<td>FMIA</td>
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<td>53.59</td>
<td>1.370</td>
<td>.001*</td>
</tr>
<tr>
<td>IMPA</td>
<td>97.65</td>
<td>97.73</td>
<td>-0.204</td>
<td>.981</td>
</tr>
<tr>
<td>Z Angle</td>
<td>61.77</td>
<td>62.15</td>
<td>-0.301</td>
<td>.765</td>
</tr>
</tbody>
</table>

DISCUSSIONS

We observed significant differences in cephalometric mean values of Angles Class II division 1 malocclusion of the Nepalese and Chinese subjects: Y axis (61.39 and 67.52), Sella Nasion Point A (SNA) angle (83.69 and 81.14), Sella Nasion Point B (SNB) angle (76.87 and 74.62), Occlusal plane (OP-SN) angle (19.0 and 23.12), Frankfort Mandibular plane angle (FMA) (28.13 and 32.87), Lower Incisor to Frankfort Horizontal plane Angle (FMIA) (54.77 and 48.23).

In both groups the mean value of SNA angle (Nepalese 83.69 and Chinese 81.14 degrees) for SNA angle suggests a well-positioned maxilla in relation to the cranial base like previous studies. This suggests more protruded maxilla in Nepalese compared to Chinese. J.W.P. Lau and U. Hagg in their study in Chinese class II division 1 found higher SNA mean value of 83.1 degree.
The SNB angles (Nepalese 76.87 and Chinese 74.62 degrees) represents retracted mandible (retrogнатhic) in relation to the cranial base. Similarly Freitas et al.\textsuperscript{1} from Brazil found SNB mean value of 75.39 degrees, similar to other researchers among other cranial structures.\textsuperscript{8,10-14} The maxillomandibular relationship determined by ANB angle showed Class II skeletal pattern, similar to the findings of ANB of 6.0 degree in Chinese class II division 1 by J.W.P. Lau and U. Hagg.\textsuperscript{9} The decrease in the ANB angle happens with the treatment.\textsuperscript{15}

The Y-axis mean value was significantly higher in Chinese (67.52 degree) than in Nepalese (61.39 degree). This suggests the position of Chin is more down and rearward in relation to the upper face in Chinese when compared with Nepalese.

The occlusal plane angle was higher in both the groups (Nepalese 19.00 and Chinese 23.12 degrees), suggesting long face (Chinese having longer face than Nepalese) with skeletal open bite. Skeletal pattern of the face is represented by FMA and is considered the most important angle of Tweed triangle.\textsuperscript{16} The FMA mean values was significantly higher in Chinese (32.87 degrees) than Nepalese (28.13 degrees) suggests longer face or vertically growing in both samples. P. Bhattarai et al.\textsuperscript{17} found FMA mean value of 28 degrees in Nepalese and P.C. Tukasan et al.\textsuperscript{16} found FMA mean value 26.66 degree on Brazilian subjects.

The FMIA angle represents a more balanced face when maintained at 65 to 75 degree.\textsuperscript{6} The present study showed statistically significant FMIA mean value, 54.77 degrees in Nepalese and 48.23 degrees in Chinese, which shows retrusive mandible in both samples but more in Chinese. The IMPA and Z angle values also show statistically nonsignificant.

Comparison between genders showed the FMIA mean values were higher in Nepalese males than Nepalese females (58.62 degree v.s. 50.92 degree) suggesting more buccal inclination of lower incisors. However a study conducted by Bhattarai P et al.\textsuperscript{17} shows no significant difference. The FMA mean values were 35.42 degrees in Chinese males and 30.31 degrees in Chinese females, which suggests Chinese males have longer face than Chinese females. The Y-axis mean values were 68.85 degrees in Chinese males and 66.19 degrees in Chinese females, which suggests that position of the chin is more downward, rearward relation to the upper face in Chinese males when compared with Chinese females.

Comparison between same genders of Chinese and Nepalese subjects showed statistically significant difference in Y-axis, SNA angle and FMIA between Nepalese and Chinese males. The mean value of Y-axis were larger in Chinese males (68.85 degrees) than Nepalese males (61.13 degrees) suggesting the position of the chin is more downward, rearward relation to the upper face in Chinese males. The SNA angle showed Nepalese males have high mean value (83.88 degrees) than Chinese males (80.94 degrees) which suggests more protruded maxilla in Nepalese when compared with Chinese males. The FMIA mean value were 58.62 degrees in Nepalese males and 46.88 degrees in Chinese males, suggesting more buccal inclination of the lower incisors in Chinese males than Nepalese males.

Among female gender, there was statistically significant difference between Nepalese and Chinese females in terms of Y-axis, SNA angle, SNB angle and occlusal plane angle. The mean value of Y-axis were larger in Chinese females (66.19 degrees) than Nepalese females (61.65 degrees) suggesting the position of the chin is more downward, rearward relation to the upper face in Chinese females. The higher mean value of SNA angle in Nepalese females than Chinese females (83.50 v.s. 81.35 degrees) suggests more protruded maxilla in Nepalese females. Between Nepalese and Chinese females, the higher mean value of occlusal plane angle in Chinese females (21.88 degrees) than Nepalese females (17.31 degrees) suggests longer face in Chinese females.

**CONCLUSIONS**

In Chinese and Nepalese students with Tweed Triangle in Angle class II, division I maloclusson both groups showed well positioned maxilla and retrusive mandible. Maxilla was more protruded in Nepalese. The Chinese showed longer face and more buccal inclination of lower incisors. The female Nepalese showed more buccal inclination of lower incisors than male. Chinese males have longer face than females.

**ACKNOWLEDGEMENTS**

I express my gratitude to Prof. Liu Qi gui, statistician of Dalian Medical University, China for his guidance in statistical analysis.

**REFERENCES**

Follow-up Study of Mortality after Clinical Protocol Based Intervention at Emergency of Patan hospital

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ABSTRACT

Introduction: Decreasing the mortality of patients is one of the major concerns of emergency department. Mortality decreases after implementation of protocol based intervention. This follow up study has been done to see the benefit of protocol based approach.

Method: This was a cross sectional study conducted at emergency department of Patan hospital from January 2013 to June 2013. All records of patient with mortality were reviewed excluding those who were brought dead.

Result: Total mortality in six months was 31. Mortality rate was 1.7 per thousand emergency visits. Mean duration of stay at emergency was five hours, range 30 minutes to 25 hours. The common diagnoses at presentation were Pneumonia 12 (45.1%), Upper gastrointestinal tract bleeding 4 (13%), Hypoglycaemia 3 (9.7%) followed by blunt abdominal trauma, penetrating neck injury, pneumothorax, spinal shock, head injury and zinc phosphide poisoning 2 (6.5%) each. The most common causes of death were septic shock 9 (29%), hypovolaemic shock 7 (25.8%), respiratory failure 6 (19.4%), hypoglycaemia 3 (9.7%), cardiogenic shock, raised intracranial pressure and spinal shock 2 (6.5%) each.

Conclusion: Protocol based management are important tools to decrease mortality but it is not the only factor that decreases the mortality.

Keywords: clinical protocol, emergency, mortality

Plain Language Summary

This study was done to see if implementing protocol based management improves mortality or not. This study highlighted the fact that protocol based management are important sufficient to decrease mortality.
INTRODUCTIONS

Mortality indicates the quality of service we provide in any department of the hospital. After a mortality review in 2011 at emergency department of Patan Hospital (PH), Patan Academy of Health Sciences (PAHS), a clinical protocol based approach was implemented to overcome three major causes of death which were respiratory failure, sepsis and hypovolaemic shock.1

There is evidence suggesting that mortality decreases after an implementation of protocol based intervention to the cause of mortality.2 So after finding out the major cause of mortality in emergency department a protocol based management was carried out. This follow up study was then conducted with an intention to find out the causes of mortality and overall mortality rate in emergency department after implementation of protocol. This study has also explored the presenting complaints and cause of mortality.

METHODS

This was a cross sectional, descriptive study reviewing records of the patient having mortality at emergency department, PAHS, Nepal, from 1st December 2012 to 30th May 2013. After reviewing mortality in 2011, an emergency department protocol was developed to treat three major causes of death; septic shock, respiratory failure and hypovolaemic shock. The protocol for septic shock was based on “surviving sepsis guidelines”.3 Hypovolaemic shock was based on “clinical review” and expert opinion. Management of respiratory failure was based on “expert opinion”. All three protocols were internally validated through in the department. One day training was conducted for all the nurses and doctors of emergency department in groups of 16 in a session on communication skills, sepsis and respiratory distress protocol developed by the faculties. Mortality records were reviewed for sex, age, duration of hospital stay, cause of death, initial diagnosis and whether vital signs was recorded on initial assessment. Incompletely documented cause of death and patients brought dead at emergency were excluded. Frequency analysis was done through SPSS 16.0. Ethical approval was taken from institutional review board of PAHS.

RESULTS

Out of 42 patients, 11 patients were excluded as they were brought dead. There was no incomplete record to be excluded. Among, the rest of 31 who died in emergency, male were 20 (64.5%) and female 11 (35.5%). Mean age was 51.9 years (range 2 to 82 years). Mean duration of stay was 5 hours, range 30 minutes to 25 hours.

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Total Number</th>
<th>Duration of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Less than 6 hours</td>
</tr>
<tr>
<td>Septic shock</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Hypovolaemic shock</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Raised intracranial pressure</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Spinal shock</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cardiogenic shock</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total (n)</td>
<td>31</td>
<td>25</td>
</tr>
</tbody>
</table>

Mortality rate was 1.7 per thousand emergency visits and 11.1 per thousand admissions.

The common diagnoses at presentation were Pneumonia 12 (45.1%), Upper gastrointestinal tract bleeding 4 (13%), Hypoglycaemia 3 (9.7%) followed by blunt abdominal trauma, penetrating neck injury, pneumothorax, spinal shock, head injury and zinc phosphide poisoning which accounted for 2 (6.5%) each. The most common causes of death were septic shock 9 (29%) due to pneumonia followed by hypovolaemic shock 7 (25.8%) due to upper gastrointestinal tract bleeding, blunt abdominal trauma and penetrating neck injury (4, 2 and 1 patients respectively); respiratory failure 6 (19.4%) which was due to pneumonia, pneumothorax and penetrating neck injury (3, 2 and 1 patients respectively); hypoglycaemia 3 (9.7%); cardiogenic shock due to zinc phosphide poisoning, raised intracranial pressure due to head injury and spinal shock due to trauma each accounted 2 (6.5%) each for mortality.

On initial evaluation heart rate was recorded in 94.4%, blood pressure on 72.2%, respiratory rate on 32.3% and temperature on 16.7% of cases.

DISCUSSIONS

We were able to decrease the mortality after implementation of protocol on three major cause of mortality. Mortality rate of 1.7 per thousand emergency visits after clinical protocol based intervention was lower than earlier figure of 2.1 during 2011 (unpolished hospital data). However, it cannot be stated that this decrease was due to implementation of protocol only. A multicentre study published about weekly mortality on emergency admission showed that mortality on weekdays was 4.9% and 5.0% on weekends.3 In another study after the intervention, early mortality decreased from 47.6 to 37.9 deaths per 1000 admissions.2
In an earlier study in 2011 done in our department had concluded that goal directed early treatment was effective and recommended protocol based approach.\(^1\) The study emphasized multiple approaches to reduce mortality. In this study, the common causes of death were respiratory failure 18 (30%), raised intracranial pressure 7 (11.7%), septic shock 7 (11.7%), cardiogenic shock and hypovolemic shock 5 (8.3%).\(^1\) After protocol based intervention in present study, the death due to respiratory failure decreased from 30% to 19.4%. The duration of stay did not change from earlier study and the higher figures for death due to septic and hypovolemic shock may be because of detection of these conditions after introduction of protocol.

Present study showed that the vital sign recording should be improved as the evidence suggests it is as a predictor of mortality.\(^5\)

The interventions aimed at increasing emergency care are effective but requires rigorous evaluation before implementation.\(^7\) The clinical protocol based intervention was useful in present study but should not be seen as the only factor that decreased mortality.

This study did not evaluate the patients who were successfully resuscitated for respiratory distress and septic shock. Further study could explore this and other possible factors that may decrease the mortality.

**CONCLUSIONS**

Implementing clinical based protocol for management of the patient is important to decrease mortality.

**REFERENCES**

Misoprostol for Termination of Second Trimester Pregnancy

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Department of Obstetrics and Gynecology, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT

Introductions: The termination of second trimester pregnancy is challenging due unfavorable cervix. This study evaluate the efficacy and maternal side effects of intravaginal misoprostol for termination of second trimester pregnancy.

Methods: During one year period from 15th June 2011 to 14th June 2012, Department of Obstetrics and Gynaecology of Patan Hospital, women admitted for second trimester termination of pregnancy for fetal congenital anomalies and intrauterine fetal demise were studied using the International Federation of Gynaecology and Obstetrics recommended doses of vaginal misoprostol. For congenital anomalies, 400 mcg 3 hourly to a maximum of 5 doses were used. For fetal demise, gestational age of 13-17 weeks received 200 mcg every 6 hourly to a maximum of 4 doses, and 18-26 weeks dose was adjusted to 100 mcg. Main outcome measures included success rate of abortion within 48 hours, induction to delivery interval and maternal side effects.

Results: There were 40 patients during study period. Success rate for termination of 2nd trimester pregnancy within 48 hours was 88.8% for congenital abnormality and 90.9% for fetal demise. For fetal demise, success of termination was 100% at 18-26 weeks. Median time from induction to delivery was 26.8 hours for congenital anomalies. For fetal demise, it was 18 hours for 13-17 weeks and 24 hours at 18 to 26 weeks respectively. Abdominal pain was seen in all doses of misoprostol.

Conclusions: Vaginal misoprostol is an effective method for termination of second trimester pregnancy.

Keywords: misoprostol, pregnancy, second trimester termination

Plain Language Summary

The study was conducted to see the effectiveness of vaginal misoprostol for termination of second trimester pregnancy. The success rate of termination for congenital abnormality and fetal demise was high. Vaginal misoprostol was an effective method for termination of second trimester pregnancy.
INTRODUCTION

The termination of second trimester pregnancy is risky because of its complications and psychological trauma to patients. It constitutes 10-15% of all induced abortions usually done for intrauterine fetal demise (IUFD), fetal congenital anomalies and medical disorders associated with pregnancy. Early detection of lethal structural and chromosomal abnormalities, and IUFD has increased the demand of rapid second trimester termination. The termination of second trimester pregnancy is a significant problem in the presence of unfavorable cervix and is often prolonged and tedious.

Among various methods of second trimester termination, evacuation and curettage induces risk of bleeding, infection, uterine perforation and cervical trauma. The introduction of misoprostol, a synthetic prostaglandin E₁ analog (PGE₁) has become an important for cervical ripening and uterotonic action. It is economic, stable at room temperature and is associated with few side effects such as fever, vomiting and diarrhea. There is still debate about doses, routes and regimes of PGE₁ for termination of pregnancy during second trimester. Studies have demonstrated greater efficacy with vaginal misoprostol than oral misoprostol. The Federation of International of Gynecologists and Obstetricians (FIGO) recommendation for second trimester termination with vaginal misoprostol states “400 mcg at 3 hours interval to a maximum of 5 doses for induction of congenital anomalies and for IUFD, the doses are adjusted to gestational age: 13-17 weeks 200 mcg every 6 hours to a maximum of 4 doses, and for 18-26 weeks 100 mcg every 6 hours to a maximum of 4 doses”. The aim of this study was to assess the efficacy and maternal side effects of misoprostol as per FIGO guidelines for termination of second trimester pregnancy.

METHODS

This was a cross sectional study of one year period from 15th June, 2011 to 14th June 2012 in the Department of Obstetrics and Gynecology, Patan Hospital. Forty pregnant women with fetal congenital anomalies and intrauterine fetal demise (IUFD) admitted for second trimester (13-26 weeks) termination were included. Counseling was done regarding the procedure, advantages and disadvantages and possible side effects. Informed consent were obtained. The gestational age was determined by menstrual history, pelvic examination and confirmed by ultrasound when last menstrual period (LMP) was not confirmed. Routine investigations were done including blood grouping, hematocrit, platelets and random blood sugar. Exclusion criteria were known hypersensitivity to prostaglandins, previous caesarean section or any surgical intervention in uterus, gravidity more than five, intrauterine contraceptive device in situ, low lying placenta, hydatidiform mole, ectopic pregnancy, adenexal mass, cardiac disease and coagulopathy.

We followed vaginal misoprostol as per FIGO protocol. The misoprostol tablets were placed in the posterior vaginal fornix. Cervical status was assessed by vaginal examination before insertion of next dose or at the onset of uterine contraction. Pethidine hydrochloride 50 mg intramuscularly was given for abdominal pain. acetaminophen 500mg oral for fever (temperature ≥ 100.4°F), and metoclopramide (10 mg) intravenous for vomiting.

Treatment success was defined as expulsion of the fetus within 48 hours after the insertion of initial dose of misoprostol. Induction to delivery interval was defined as the time from the initial dose of misoprostol to the expulsion of fetus. Maternal side effects such as abdominal pain, fever (temperature ≥ 100.4°F), nausea, vomiting, diarrhea and excessive bleeding requiring blood transfusion based on clinical examination and hematocrit less than 23% were recorded. Completion of termination was assessed by visual examination of abortus, bleeding, pain, and vaginal examination to see the status of cervical os. Uterine curettage was performed if retained product of conception was detected on vaginal examination after expulsion of fetus and placenta. All women who did not abort within 48 hours of misoprostol induction, depending on their cervical status and amniotic membrane integrity received a transcervical Foley catheter 18 Fr, balloon inflated with 50 ml of distilled water and kept in situ for 24 hours or intravenous oxytocin infusion.

Statistical Package for Social Sciences (SPSS) version 13 was used for descriptive analysis.

The study was approved by the institutional review committee of PAHS.

RESULTS

There were forty women, 31 with IUFD and nine congenital anomalies for termination of pregnancy during the second trimester of 13-26 weeks.
Table 1. Characteristics of patient undergoing second trimester abortion (n= 40)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age ± SD (years)</td>
<td>26.30 ± 5.04</td>
</tr>
<tr>
<td>Mean GA ± SD (weeks)</td>
<td>20.32 ± 4.05</td>
</tr>
<tr>
<td>Mean Gravidity ± SD</td>
<td>1.88 ± 1.04</td>
</tr>
<tr>
<td>Primigravida</td>
<td>19 (47.50%)</td>
</tr>
<tr>
<td>Multigravida</td>
<td>21 (52.50%)</td>
</tr>
<tr>
<td>Congenital Anomalies</td>
<td>9 (22.50%)</td>
</tr>
<tr>
<td>IUFD</td>
<td>31 (77.50%)</td>
</tr>
</tbody>
</table>

Note: n = Total number of patients, SD = Standard Deviation, GA = Gestational Age, IUFD= intrauterine fetal demise

Table 2. Characteristics of patient undergoing second trimester abortion (n= 40)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean ± SD (years)</th>
<th>Mean GA ± SD (weeks)</th>
<th>Mean Gravidity ± SD</th>
<th>Primigravida</th>
<th>Multigravida</th>
<th>Congenital Anomalies</th>
<th>IUFD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.30 ± 5.04</td>
<td>20.32 ± 4.05</td>
<td>1.88 ± 1.04</td>
<td>19 (47.50%)</td>
<td>21 (52.50%)</td>
<td>9 (22.50%)</td>
<td>31 (77.50%)</td>
</tr>
</tbody>
</table>

Of 31 fetal IUFD, 11 (35.49%) were of gestational age 13-17 weeks and 20 (64.51%) of 18-26 weeks.

At 48 hours, the successful termination in 31 IUFD was 90.9% (10 of 11) at 13 to 17 weeks and 100% (20 of 20) at 18-26 weeks. The success rate was 88.8% (8 of 9) for congenital anomalies. Median induction to delivery time was 26.8 hours with 400 mcg Misoprostol for congenital anomalies. For IUFD, it was 18 hours with 200 mcg at 13 to 17 weeks and 24 hours with 100 mcg at 18 to 26 weeks.

Table 2. Vaginal Misoprostol induction to delivery time in patient undergoing second trimester abortion (n=40)

<table>
<thead>
<tr>
<th>Vaginal dose of misoprostol (mcg)</th>
<th>Number of patients</th>
<th>Mean gestational age ± 50 (weeks)</th>
<th>Total doses required (number of patients, %)</th>
<th>Number of patients with induction to delivery time</th>
<th>Induction to delivery time (hrs)</th>
<th>Median (q1*,q3*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>9</td>
<td>20.36 ± 3.44</td>
<td>5 (88.9)</td>
<td>7</td>
<td>26.8</td>
<td>(20, 41.5)</td>
</tr>
<tr>
<td>200</td>
<td>11</td>
<td>15.90 ± 1.87</td>
<td>2 (3,27.3)</td>
<td>3</td>
<td>18</td>
<td>(12, 26)</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>22.73 ± 3.09</td>
<td>1 (2,10)</td>
<td>0</td>
<td>24</td>
<td>(14, 26)</td>
</tr>
</tbody>
</table>

Q= quartile

For women who did not abort within 48 hours of misoprostol induction, 11.2% (1 of 9) for congenital anomalies received trans-cervical Foley catheter whereas 9.1% (1 of 11) for IUFD at 13 to 17 weeks received intravenous oxytocin infusion. All of them expelled the fetus successfully.

Abdominal pain was seen at all doses and nausea vomiting at high dose of misoprostol

Table 3. Maternal complications of vaginal Misoprostol induction in patient undergoing second trimester abortion (n=40)

<table>
<thead>
<tr>
<th>Side Effects</th>
<th>400 mcg (N=9)</th>
<th>200 mcg (N=11)</th>
<th>100 mcg (N=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain</td>
<td>4 44.44</td>
<td>6 54.54</td>
<td>5 25</td>
</tr>
<tr>
<td>Pyrexia (&gt;100.4°F)</td>
<td>1 11.11</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Nausea vomiting</td>
<td>2 22.22</td>
<td>0 0</td>
<td>0 0</td>
</tr>
</tbody>
</table>

None of our patient required transfusion for excessive bleeding. There was no mortality in this series.

DISCUSSIONS

In this study the success rate within 48 hours of misoprostol induction was 88.8% (8 of 9) for congenital anomalies which is comparable to 90.5%. For IUFD, the success rate was 90.9% (10 of 11 cases of 13 to 17 weeks) and 100% (20 of 20 cases of 18-26 weeks), higher than 87.2% reported by Jain et al.5

The required amount of misoprostol not only decreases with increasing gestational age, but has also been found to be lower in women with a dead fetus. This may be due to intrinsic changes in the uterus and cervix that make the myometrial cells sensitive to stimulant and cervical tissues favorable to ripening agent after fetal death.12 The cervix of pregnant women with dead fetus tends to efface more readily and dilate when compared with that of the live fetus. J. Srisomboon and S. Pongpisuttinun have also concluded that intrauterine fetal death had higher success rate and aborted earlier than those with a live fetus by comparing the efficacy and safety of 200 mcg of intravaginal misoprostol administered every 12 hours between live and dead fetuses in second trimester.17

In this study, the median induction to delivery interval was 26.8 hours (Q1, Q3: 20, 41.5 hours) in 400 mcg for congenital anomalies whereas 18 hours (Q1, Q3: 12, 26 hours) in 200 mcg for IUFD at 13 to 17 weeks and 24 hours (Q1, Q3: 14, 26 hours) in 100 mcg for IUFD at 18 to 26 weeks respectively.

Several studies have evaluated the use of misoprostol for induction of labour in the second trimester. There are different regimes for the use of misoprostol in termination of second trimester pregnancy. In this study, we used the protocol recommended by the FIGO for second trimester termination with vaginal misoprostol: 400 mcg at every 3 hours interval to a maximum of 5 doses for induction of congenital anomalies. For IUFD, doses were
adjusted to gestational age: between 13-17 weeks 200 mcg every 6 hours interval to a maximum of 4 doses, and between 18-26 weeks 100 mcg every 6 hours interval to a maximum of 4 doses.11

The most common maternal side effects observed in this study were abdominal pain followed by nausea, vomiting and pyrexia. Symptomatic management was successful. Other authors have observed fever as the most frequent side effects.13-17

CONCLUSIONS
Vaginal misoprostol was effective with minimal side effects for termination of second trimester pregnancy for fetal congenital anomalies and intrauterine fetal demise.

REFERENCES
Outbreak of Extended Spectrum Beta Lactamase Producing *Klebsiella* Species Causing Neonatal Sepsis at Patan Hospital in Nepal

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1Lecturer, 2Assistant Professor, 3Professor, Department of Pediatrics, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT

*Introduction*: *Klebsiella* sepsis is the most important nosocomial infection in neonates. The objectives of this study were to review an outbreak in a neonatal unit caused by *Klebsiella* species, to identify the source of the infections, and to identify infection control measures for eradication and prevention of these infections.

*Methods*: The case notes and investigation reports of all sepsis cases admitted in neonatal units of Patan hospital from July to December 2011 caused by *Klebsiella* species were retrospectively reviewed. The demographic profile, risk factors along with clinical features and management of sepsis were reviewed.

*Results*: Twenty three out of 37 neonatal blood cultures grew *Klebsiella* species. Thirty one were *K. pneumoniae* and six *K. oxytoca*. Seventeen of the 31 (55%) *K. pneumoniae* isolates were multidrug resistant and extended spectrum beta lactamase producers. Eighteen of 23 (78%) neonates with *Klebsiella* sepsis died. After extensive cleaning methods and identifying an intermittently leaking roof in one of the nurseries below a vescicovaginal fistula room of gynecological ward above, the infection outbreak was finally controlled.

*Conclusions*: Infections with extended spectrum beta lactamase producing *Klebsiella* spp. are a threat in neonatal units because of limited treatment options for these multidrug resistant organisms. Identification of the source and control of the outbreak can be a challenge.

*Keywords*: extended spectrum beta lactamase, *Klebsiella*, multi drug resistant, neonates

**Plain Language Summary**

The study was done to review an outbreak caused by *Klebsiella* species, to identify the source of the infections along with infection control measures for eradication and prevention of these infections in neonate unit. Identification of the source and eradication of the outbreak of *Klebsiella* species can be a challenge. Hand washing remains one of the most important methods to prevent cross infections and nosocomial infections.
INTRODUCTIONS

*Klebsiella pneumoniae* is the most common pathogen among the *Klebsiella* species,1 and there has been an increase in the incidence of nosocomial infections caused by *K. pneumoniae* strains producing extended-spectrum beta-lactamases (ESBL).2-4 The widespread use of broad-spectrum antibiotic in intensive care units (ICU) favors development of multidrug resistant (MDR) organism.5,6 There was an outbreak of ESBL producing MDR *Klebsiella* species in a neonatal unit of Patan hospital. All the neonates infected with ESBL *Klebsiella* had similar signs and symptoms. The retrospective review of charts was done to identify the source of infections, measures to control and prevent such incident.

METHODS

This cross sectional, descriptive study was performed in three sites of neonatal units: nurseries (clean and septic), neonatal intensive care unit (NICU) and pediatric intensive care unit (PICU) of Patan Hospital, a tertiary care teaching hospital of Patan Academy of Health Sciences. Approval was taken from Institutional Review Committee. Neonates without any risk factors for sepsis are admitted to the clean nursery, while neonates with risk factors for sepsis, and those who have positive blood, urine or stool cultures, diarrhoea, conjunctivitis or skin infections are kept in a ‘septic nursery’. Among the neonates requiring ICU care, the inborn babies (delivered in Patan Hospital) are admitted to NICU while the outborn neonates (born outside Patan Hospital) are admitted to PICU. The case notes of all babies infected with *Klebsiella* during the six month duration (July to December 2011) were reviewed. Clinical and demographic data for each patient were recorded. The maternal case-notes were reviewed to evaluate maternal risk factors for the infection like history of premature rupture of membrane, foul smelling liquor and maternal fever.

While reviewing the maternal case-notes, we looked for antenatal risk factors such as history of premature rupture of membrane (PROM), maternal fever, number of per vaginum examination and use of antepartum antibiotics.

The environmental sampling included laryngoscope blades, ventilator, stethoscopes, equipment trolleys, incubators, central lines, tip of endotracheal tubes, suction tubes, tap water, floor and door handles. These environmental cultures were obtained fortnightly and sent to microbiology laboratory of Patan hospital. Hand swabs and rectal swabs from all the staffs working in the neonatal units, culture of purified water and disinfectants, and swabs from the air conditioning unit were also sent. All neonatal nurseries and ICUs were inspected in detail for any source of infection such as leaking roofs, damp walls and plumbing defects.

*Klebsiella* isolates from cases not responding to antimicrobial therapy reported as susceptible were also sent to the Microbiology Unit at Canterbury Health Laboratories (CHL), Christchurch, New Zealand.

The isolates were also screened for the production of ESBL by the double disk diffusion procedure. The presence of *Klebsiella* producing carbapenemases (KPC) and metallo-β-lactamase (MBL) enzymes were tested by the inhibition of the enzyme using boronic acid for KPC and dipicolinic acid for MBL.7 The presence of a carbapenemase was confirmed using a multiplex PCR8 and DNA sequencing on a representation of each *K. pneumonia* antibiogram pattern; four patterns were seen. Microsoft excel 2010 was used for descriptive analysis.

RESULTS

Twenty three neonates were included. All 23 neonates had hypotension, respiratory failure, acute renal failure, and disseminated intravascular coagulation with Multiorgan Dysfunction Syndrome (MODS).

Eighteen out of 23 neonates (78%) died. Out of 23 neonates, sixteen (70%) were males and seven (30%) were females. Twenty out of 23 (87%) were premature and low birth weight.

Fifteen out of 23 (65%) neonates were delivered by normal vaginal delivery and eight out of 23 (35 %) were born through caesarean section. Of the twenty-three babies, 15 were admitted in NICU, five in PICU, two in the septic nursery and one in the clean nursery. Out of 23 neonates, ten (44%) neonates acquired *Klebsiella* infection in NICU, seven (30%) in septic nursery, five (22%) in PICU and one (4%) acquired in clean nursery. Out of 23 neonates, 18 needed mechanical ventilation and only two survived. Eight infants had umbilical venous catheter and five had umbilical arterial catheter inserted. Out of thirteen umbilical catheters, eleven were kept for more than three days. Meningitis was present in five neonates and *Klebsiella pneumoniae* was isolated from cerebrospinal fluid (CSF) in one.

There were no associated maternal risk factors for neonatal sepsis in these babies. The first blood culture taken within 72 hours of birth were negative in all neonates.

Out of thirty-seven *Klebsiella* isolates, 23 were from blood, eight were from the endotracheal tube-tip, three from urine, two from umbilical catheters and one from CSF.
Out of twenty-three *Klebsiella* isolates in blood, two neonates had repeated positive blood cultures; out of which four were from one neonate and two from another neonate. Out of eight *Klebsiella* isolates in endotracheal tube-tip, in two neonates, it was isolated on two different occasions. In those who had positive isolates in urine, umbilical catheter and endotracheal tube-tip, the same organisms were also isolated in blood cultures. The infant who had positive CSF culture for *Klebsiella* had negative blood cultures.

Thirty-one were identified as *K. pneumoniae* and six were *K. oxytoca*. Infection with *K. pneumoniae* was associated with disseminated intravascular coagulation (DIC) and refractory hypotension. Seventeen out of 18 neonates who died had *K. pneumoniae*, and one had *K. oxytoca*.

Seventeen out of 37 *K. pneumoniae* isolates were MDR and ESBL producers. They were resistant to all the first line, ampicillin and amikacin and second line drugs, cefotaxim/chloramphenicol and ofloxacin, and...
some were resistant to third line drugs, meropenem/imipenem/piperacillin-tazobactum/cefoperazone-sulbactum and colistin used in our neonatal units. Twenty-three isolates were sent to CHL, New Zealand for microbiological confirmation and subtyping. Nine out of eleven isolates were confirmed as K. pneumoniae and two as K. oxytoca. All nine K. pneumoniae isolates were confirmed as MDR and ESBL producers. The K. pneumoniae isolates showed intermediate resistance to meropenem and imipenem except in one which showed complete resistance to meropenem. These Klebsiella isolates were only sensitive to colistin. Out of these nine, seven Klebsiella pneumoniae isolates were reported sensitive to carbapenems in Patan Hospital. Out of the five neonates who survived, three had received colistin. The details of culture and sensitivity patterns along with subtyping of Klebsiella isolates in twenty-three neonates are shown in Table 1.

The subtyping of Klebsiella isolates were done at CHL, New Zealand and the strain was found to be NDM-1 (New Delhi Metallo-beta-lactamase) strain in five neonates which was resistant to all beta lactams.

Klebsiella was isolated in various environmental cultures such as laryngoscope blades, suction jar, jar containing purified water, tap water, and a hand of health care worker. Additionally, swab from the air conditioner also grew Klebsiella species. None of these environmental isolates were MDR or ESBL. Rectal swab of all health care workers in our neonatal units were found to be negative for ESBL producing Klebsiella species.

An intermittent leaking roof with a toilet drain pipe was noted in one of the nurseries situated below the vescicovaginal fistula (VVF) room of Gynecology ward. Further investigation revealed that MDR Klebsiella were isolated in the urine specimens of patients in the VVF room and in the surface cultures of the room.

DISCUSSIONS

Eighteen out of 23 neonates died in this study. Thirty-seven Klebsiella species were isolated in six months duration. Out of 37 isolates, 17 were extended spectrum beta lactamase producers and multidrug resistant Klebsiella which were resistant to all first and second line antibiotics.

Several outbreaks of infection caused by K. pneumoniae isolates that are simultaneously resistant to broad-spectrum cephalosporins and aminoglycosides have been widely reported.9-12 Klebsiella can cause serious infections such as bacteremia, pneumonia, and urinary tract and soft tissue infections, particularly in immunosuppressed and hospitalized patients. Bacteremia and meningitis are common in pediatric patients, especially those in NICUs.13,14 These infections are frequently caused by multidrug-resistant strains and have a high mortality rate.15 Low birth weight, mechanical ventilation, prolonged hospitalization, use of third-generation cephalosporins, and invasive procedures are important risk factors for the emergence of nosocomial infections in intensive care units and for high mortality.16,17 More than 50% of the neonates affected in this study had low birth weights and were premature. Out of twenty-three, 18 required mechanical ventilation and eight had central (umbilical) venous or arterial catheters. Klebsiella was isolated in eight out of 18 endotracheal tube-tip cultures and six out of eight neonates died who grew Klebsiella in their endotracheal tip. Two out of 13 umbilical lines grew Klebsiella and both neonates died. Klebsiella infections may spread rapidly from medical devices, soap and disinfectants, blood products, and the hands of hospital staff.13,18

In view of Klebsiella outbreak of from contaminated disinfectant in a neonatal and pediatric intensive-care unit,13 we tested all disinfectant solutions which were used in our neonatal units. All the disinfectants were equally effective for Klebsiella. ESBL Klebsiella has also been linked to artificial nails.19 Melek Ayan et al20 reported Klebsiella outbreaks in premature neonates with intravenous catheters, mechanical ventilation or both, and high mortality rate (76.7%) was noted. In this study, more than half of the patients had low birth weight, were premature, or underwent mechanical ventilation. Approximately three-fourths of the patients died. In our series, 87% of the babies with Klebsiella sepsis were premature and low birth weight while the mortality rate of 78% is almost comparable to the Melek Ayan’s study. More than half of the strains in the study by Melek Ayan were resistant to many beta-lactam antibiotics, amikacin, and trimethoprim/sulfamethoxazole. Resistance to multiple antibiotics, mainly to broad-spectrum beta-lactam antibiotics was observed, particularly in Klebsiella pneumoniae isolates. Similarly, resistance to expanded-spectrum cephalosporins is reported for most of the Klebsiella pneumoniae species.9,15,21 In our study, Klebsiella pneumoniae isolates were resistant to all the beta lactams.

There is increasing evidence of the emergence of carbapenem resistant isolates.22,23 In the study by Hanna Sidjabat et al24 carbapenem resistance in Klebsiella pneumoniae due to NDM-1 beta lactamase was demonstrated. Similarly, study done by Dongeon Young et al24 also characterized NDM-1 gene and a novel erythromycin esterase gene on a unique genetic structure in Klebsiella pneumoniae sequence type 14.
From India. Comparing our study with them, six out of eleven patients who were ESBL K. pneumoniae were intermediate, two were resistant and the rest were sensitive to meropenem. Regarding imipenem, six were intermediate, four were resistant and only one was sensitive. Carbapenem resistant organisms were of NDM-1 strain. Timothy R Walsh et al. found the dissemination of NDM-1 positive bacteria in New Delhi environment (water supply and sewage effluent samples). Similarly, Mariana Castanheira et al. found early dissemination of NDM-1 producing enterobacteriaceae in Indian hospitals. Although we cannot extrapolate these data for our country, with emerging carbapenem resistant NDM-1 strain Klebsiella pneumoniae, there is a need for a broad environmental survey.

In addition to surveillance cultures, various infection control strategies were implemented. Revised cleaning policy was added to our infection control protocol. 1% virkon was used for cleaning equipments after testing its efficacy to inhibit Klebsiella species in-vitro. After each new MDR Klebsiella infection, surface cleaning, high dusting, and fumigation of neonatal units were done. The routine chlorination of water sources was inspected. Purified water was used in humidifiers of ventilators. Disposable paper-towels were used instead of cloth towels in all neonatal units. Staffs and visitor gowns were changed every morning. All visitors were advised to use gowns hung in the designated pegs. All visitors were informed about hand washing policy. Air conditioner was cleaned. Disposable tubings for ventilators were used. Discarding of infected equipments was done. Cleaning protocols for ventilators were implemented. The importance of hand washing was emphasized to all the staffs working in neonatal units. Bedside cleansing solution Microshield (chlorhexidine) was used in all neonatal units. Universal decontamination using daily chlorhexidine bath for all neonates was implemented. The nursery with the leaking roof was eventually closed and was shifted to another room.

After implementation of these infection control measures, we have now reduced the infection with MDR and ESBL Klebsiella species. Hence, we need to do prospective studies to conclude that how useful these measures are to prevent the outbreak.

According to our hospital policy, the microbiology laboratory does test the antimicrobial sensitivity on surface swabs culture. Therefore, we were unable to prove that the leaking roof was indeed the source of the outbreak. However, closing this nursery below the VVF room finally eradicated the infection outbreak. In addition, some patients who were admitted in the VVF room also had similar Klebsiella infection to the infants in the nursery, which strengthens the speculation. The main limitation of our study is that, this being a retrospective study, some of the information were missing on the medical notes especially information regarding the risk factors for sepsis.

Conclusions

Infections with ESBL Klebsiella pneumoniae was a major cause of morbidity and mortality among neonates in Patan Hospital during the outbreak with the limited treatment options for MDR organisms. The emergence of ESBL and carbapenem resistant Klebsiella pneumonia pose a great challenge for clinicians.

Acknowledgements

We would like to thank Dr. Abhilasha Karkey and Mr. Krishna G. Prajapati, Department of microbiology, Patan hospital, who helped us in culture and sensitivity of Klebsiella and sending these isolates to New Zealand for confirmation.

References


Hepatitis B and HIV in Children and Pregnant Ladies at Patan Hospital
Imran Ansari
Associate Professor, Department of Pediatrics, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT
Introductions: The primary objective of this study was to find the prevalence of Hepatitis B and HIV infections in children and pregnant ladies visiting Patan Hospital. The secondary objective was to investigate how these individuals may have got infected, the clinical presentation and outcome.

Methods: Laboratory records of all individuals tested for Hepatitis B and HIV between 2006 July to 2011 Aug were included. The charts were reviewed for history and clinical findings.

Results: Out of 44,958 individuals who were tested, 229 were positive. The prevalence of HIV was 0.2% and HBV 0.3% and both was 0.01% (5). The numbers of children under age of 15 and of pregnant ladies were 13 and 32 respectively. Risk factors identified in 40 adult patients were: intravenous drug use, multiple sex partners, working abroad and long distance drivers. Twenty-seven patients died, all with HIV. Of the 32 pregnant ladies 31 were discovered by routine testing. All the babies born were healthy. Fever, cough and breathing difficulty were the most common presenting features. Ten were treated for pneumonia and 3 for TB. Parents of 5 HIV-infected infants also had the same infection themselves. There was no death among children.

Conclusions: The prevalence of HBV and HIV was low. HBV was a ‘hidden’ infection, discovered on routine testing of asymptomatic pregnant ladies. Almost all children got these infections through vertical transmission.

Keywords: HVB, HIV, infection, seroprevalence

Plain Language Summary
This study was conducted to see prevalence of Hepatitis B and HIV in pregnant ladies and children at Patan Hospital, Nepal. Charts were reviewed. Prevalence of both was found to be very low.
INTRODUCTIONS

Viruses responsible for Hepatitis B and HIV infections are transmitted through sexual intercourse, blood transfusion and vertically from mother to fetus. Health personals may get infected if universal precautions are not practiced.

An estimated 75,000 (16,262 confirmed) people are living with HIV/AIDS in Nepal. There is lack of data about the magnitude of this problem among patients visiting Patan Hospital. Data and knowledge on this issue will motivate health professionals to comply with institutional plans and policy of universal precaution.

This aim of this study was to find out overall HIV and HBV infections in patients coming to Patan Hospital, their clinical presentation, and outcome and to investigate how they may have got infected.

METHODS

It was a hospital based cross sectional, descriptive study. Laboratory records of all individuals tested for Hepatitis B and HIV infections between July 2006 to Jul 2011 were included in the study. Hospital numbers of all the positive results were noted to retrieve patient files from the record section of the hospital. Relevant findings, like presenting complaint, risk behavior, physical findings and outcome were studied. Approval for the study was taken from hospital authority.

RESULTS

A total of 44,958 individuals were tested for both Hepatitis B and HIV in the five year study period. Of them 229 (0.51%) were positive; 136 (0.3%) for Hepatitis B, 88 for HIV and 5 (0.01%) for both.

Out of total infected individuals 153 (66.8%) were in the active age group of 26 to 49 years. Infected children up to 14 years of age were 13 (5.7%); 11 HIV and two HBsAg positive. There was no co-infection in the pediatric population. Pregnant ladies were 32 (14%); 29 HBsAg, two HIV and one both.

### Table 1. Individual and co-infection of Hepatitis B and HIV in male and female patients

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBsAg</td>
<td>76</td>
<td>58</td>
<td>134</td>
</tr>
<tr>
<td>HIV</td>
<td>56</td>
<td>34</td>
<td>90</td>
</tr>
<tr>
<td>HBsAg &amp; HIV</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>135</td>
<td>94</td>
<td>229</td>
</tr>
</tbody>
</table>

Overall, fever in 74 (32.3%), cough in 58 (25.3%) were common presenting complaints (Figure 1) and 48 (21.8%) patients had both of these symptoms. In 32 (14%) pregnant ladies the infections were discovered during routine ante-natal investigation. Tuberculosis was detected in 61 (28%) patients. Among 14 children, fever in 10 (71.4 %), cough in 8 (57.1%) and breathing difficulty in 5 (35.7%) were the common complaints. Ten were treated for pneumonia and three for disseminated TB. Three children had oral thrush.

Risk factors could be identified in only 40 (17.5%) cases and among these, intravenous drug use was 16 (40%) and patients with multiple sex partners, working or worked abroad, and long distance drivers were each 8 (20%).

In order to find the source or spread, spouses of adult and parents of children were screened. Total of 16 instances of
spouse-testing were documented, 12 in patients infected with HIV and 4 in those with the HBsAg. Half of those tested were positive (7 HIV, 1 HBsAg). Eleven patients had other members of the family (sibs, parents) also infected with same virus as the index case (10 HBsAg, 1 HIV). Mothers of two and both parents of one HIV infected infant tested positive. Both parents of another child had died of AIDS. Father of one child worked abroad as driver in a hotel and that of another was getting antiretroviral treatment from Shaheed Shukra Raj Tropical Hospital, Teku, Nepal. One mother of an HIV infected child refused to undergo screening test.

During study period 48 (21%) patients improved and were discharged, 20 (9%) left against medical advice. There were 27 (12%) mortality, all were HIV infected which amounts to 30.7% (27 of 88) case fatality for HIV. Thirty one patients with HIV were referred to Teku Hospital for further management. There was no death in the HBsAg goup.

Of the 32 pregnant ladies who were HBsAg positive, 23 (72%) delivered by vaginal route, six underwent caesarian section (one had twin) and three went to deliver at some other facility. All the babies born to these infected mothers were healthy and weighed between 2850 g and 3900 g. There was no fetal loss in the present pregnancy but 2 of them had history of abortions in the past.

DISCUSSIONS

Overall sero-prevalence in 44958 patients tested was 229 (0.5%); of which 136 (0.3%) were Hepatitis B positive, 88 (0.2%) HIV and 5 (0.011%) both is comparable with the findings four years ago in 2009 in Kathmandu in which 21,716 units of blood donated for transfusion were found infected with HBsAg in 0.47% and 0.21% with HIV. Another study from medical college in Western Nepal had high sero-prevalence of 3.4% of HIV which could be due to higher risk factors in that areas and needs in-depth research. The co-infection rate of HBV and HBsAg (0.011%) in our study is lower than what Ghimire P et al found (0.033%) in their research in ‘blood donors’. This is an important finding for further analysis to see whether the donors were individuals donating blood to fill their financial need for high-risk life style.

Males 135 (59%) were affected more than females in this study similar to findings of Ashish et al, in contrast to Paudel BN who observed a female predominance probably due to different target group.

Similar to other studies, two-thirds (153) of the sero-positive patients in present study were sexually and economically active age groups of 25 to 49 years old. All 13 (6%) children under 15 years of age were victims of mother to child transmission (MTCT).

The people of Mongolian race constituted one third (71; 31%) of the infected in our study, which could be due to more male members of this race are in security jobs in India and other countries, being away from family for long periods, and engaging in unsafe sexual activities may increase the risk of infections. A WHO document of 2010 has also reported high prevalence of these infections in the tribal population of India.

Most common reasons for the patients to seek medical advice was cough in 74 (32%), fever in 58 (25%) and both in 48 (21%). These findings are similar to those of Siddiqui MH who found fever (59.6%) and cough (28.8%) as major presenting complaints in their patients in Karachi, Pakistan. Also, 64 (28%) of them had tuberculosis is significant finding due to compromised immune defenses in HIV patients.

In 40 cases there were identifiable risk factors; intravenous drug use (16), multiple sex partners (8), working abroad (8) and long distance drivers (8). All of these behaviors/professions are well known for their relationship with the two infections under study. The reason for the majority of the cases with no known risk factor may be due to the sensitive nature of and the social stigma attached to these conditions.

Since HBV and HIV can spread to the sex partner, only 16 instances of spouses agreed for testing of whom 8 were positive. It can be assumed that more would have been discovered had there been wider coverage of investigations. Other family members (siblings, parents) were found to have infected in 11 instances, possibly from the common source, i.e. parent. Eight of the 13 children tested positive had direct or indirect evidence of MTCT.

The overall mortality rate of 12% and HIV case fatality rate of 29% in this series is higher than 4.3% mortality reported by Paudel BN from Seti Zonal Hospital Nepal which could be due to more serious or critical pool of patients coming to Patan Hospital for tertiary level care. The study may have missed the infections in window period.

CONCLUSIONS

The overall sero-prevalence of 0.2% HIV, 0.3% HBV and 0.01% both in individuals tested at Patan Hospital is low. This study reveals hidden infections in unsuspected pregnant women an importance of universal precautions. All children in this series had infections from their mothers through vertical transmission.
REFERENCES


Conversion from Laparoscopic to Open Cholecystectomy

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¹Assistant Professor, ²Lecturer, ³Associate Professor, ⁴Professor, Department of Surgery, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT

Introduction: With the advent of newer technology, the era of open surgery for gall bladder diseases has been preferably taken over by laparoscopic cholecystectomy. However, certain cases still require conversion to open surgery. In this review we aim to analyze the reason for conversion.

Methods: This retrospective study was conducted at Patan Hospital, Patan Academy of Health Sciences, Nepal. All patients who underwent laparoscopic cholecystectomy from February 2009 to July 2012 were included in the study. File numbers of all the patients were obtained from operation room register. The patient files were analyzed for age, sex, duration of symptoms, liver function tests, ultrasound findings and the description in operation note for reason for conversion.

Results: The age ranged from 12 to 81 years with mean age of patients 32.76 years and male to female ratio 1:2.9. The mean operating time was 65 minutes and average post operative hospital stay was 1.61 days. Out of 305 patients, 34 (11.14%) required open conversion. Factors responsible for open conversion were dense fibrosis at Calot’s in 11 (3.6%), adhesions due to previous abdominal surgery in 6 (1.9%), uncontrollable bleeding in 5 (1.6%), bile duct injury in 4 (1.3%) cholecystoenteric fistula in 3 (0.9%), Mirizzi’s syndrome 2(0.6%).

Conclusions: Adhesions at the calot’s triangle was the common reason for conversion from laparoscopic to open cholecystectomy.

Keywords: adhesions, conversion, gallstone, laparoscopic cholecystectomy

Plain Language Summary

This study was conducted to determine the predictive factors for conversion of laparoscopic cholecystectomy. The study found that dense adhesion around calot’s triangle and adhesions pertaining to previous abdominal surgery were the main reasons for conversion to open surgery. So, before embarking on laparoscopic cholecystectomy, it is essential to take detail history and examination, to rule out the probable cause of conversion beforehand and minimize; morbidity, duration of surgery and cost.
INTRODUCTION

Since its introduction in 1987 by Philip Mouret, laparoscopic cholecystectomy (LC) as minimally invasive procedure has become the gold standard. However, for various reasons there are conditions to convert to open cholecystectomy (OC). Inability to correctly identify the anatomy of the Calot’s triangle due to inflammation, adhesion, or anatomical variations are some common conditions for conversion. This study was conducted to analyze the conversion cause and rate for conversion to open surgery in patients who underwent laparoscopic cholecystectomy at Patan Hospital (PH).

METHODS

This retrospective cross sectional, descriptive study was conducted at Patan Hospital, Patan Academy of Health Sciences, Nepal. All patients who underwent laparoscopic cholecystectomy or conversion to open surgery from February 2009 to July 2012 were included in the study. File numbers were obtained from operation room register and patient files retrieved from record section. Patients age, sex, duration of symptoms of gallstones (acute or chronic cholecystitis), liver function tests (LFTs including serum alanine transaminase, aspartate transaminase, alkaline phosphatase and bilirubin), ultrasound findings, types of anesthesia and the operation notes (for number of ports, anatomy of Callot’s triangle, size of common bile duct (CBD)) were analyzed for reason of conversion from laparoscopic to open surgery and mortality. Ethical approval was taken from ethical review committee of Patan Academy of Health Sciences (PAHS).

RESULTS

There were 305 patients charts available (out of total 316 patients registered in operation theater record book, 11 files were not found in record section) for analysis. There were 70 (22.95%) males and 235 (77.05%) females, age 12 to 81 years (mean 32.76 years), chronic calculus cholecystitis in 276 (90.5%), acute calculus cholecystitis in 17 (5.6%), gall bladder polyp in 12 (3.9%). Thirty four (11.14%) patients required conversion to open method. Of them 22 (64.70%) were male and 12 (35.30%) female. The most common reason for conversion was fibrosis around calot’s triangle (figure 1), four (1.3%) had bile duct injury - two due to diathermy injury in CBD, and two CBD injury during dissection) and five (1.6%) had bleeding (one each from cystic artery, hepatic artery and three from gallbladder bed). Post operative hospital stay ranged from 1 to 18 days (mean 1.61 days) as per our existing policy. 205 (67.21%) patients were discharged on 1st postoperative day. Remaining 65 (21.31%) on 2nd post operative day, 21 (6.88%) on 3rd post operative day as patient preference. Six (1.96%) patients developed postoperative fever, three each had chest infection and urinary tract infection. All patients with fever were managed conservatively and discharged within 6th post operative day. Eight (2.62%) patients had postoperative bile leak recovered after conservative management and were discharged on 7th (3 patient), 8th (2 patient), 12th (1 patient), 17th (1 patient) and 18th (1 patient) day respectively. There was no mortality in this series.

DISCUSSIONS

The conversion rate in our study was 11.14% (34 of 305), which compares well with the incidence reported in the literature, which varies from 2% to 15%. In developed countries less than 20% of total cholecystectomies are performed by open method. In developing countries the open method is still common due to lack of skill and apparatus.

We had 11 patients with unclear Calots triangle anatomy and six had adhesions associated with previous abdominal surgery. Among five uncontrolled bleeding, majority (three) were due to cystic artery injury, and one each because of hepatic artery bleed and liver bed bleed. We noticed bile duct injury in two patients who required conversion. Similar findings of difficulty dissection of Calot’s triangle, adhesions, bleeding and bile duct injury as cause of conversion has been described. Precise identification of cystic duct junction with gall bladder at one end and CBD at other end before and avoiding blind use of cautery and clips are useful to prevent bile duct injury.

In our study, we had no difficulty in creation of pneumoperitoneum. Situations, where difficulty in gallbladder extraction or instrument failure necessitated
conversion did not arise. There were no deaths reported. The limitation of our study was, we have not quantified the thickness of the gallbladder wall as the ultrasound data available were incomplete. Many other parameters such as obesity; diabetes mellitus; body mass index and preoperative Endoscope retrograde cholangiopancreatography (ERCP), which have been studied in other studies, could not be included in this study because of retrospective nature of data collection.

Several possible factors responsible for conversion have been studied. In particular, prediction of conversion through the analysis of preoperative factors responsible for conversion has been studied. These include age; sex; obesity; diabetes mellitus; body mass index; duration of symptoms; total leukocyte count; LFT; ultrasound; acute cholecystitis; history of biliary diseases such as jaundice, cholangitis, history of pancreatitis and preoperative endoscopic retrograde cholangiopancreatography.5,6

CONCLUSIONS

The most common cause of conversion of LC to OC was adhesion at calot’s triangle which results difficulty in delineating biliary anatomy. Though, conversion rate in our study is comparable, we can minimize intraoperative complication with low threshold for conversion.

REFERENCES

Spirometry Findings in Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Introduction: Clinical diagnosis of chronic obstructive pulmonary disease is often not accurate and treated for prolong duration. This study explores the use of pulmonary function test to confirm the diagnosis and further management of such patients.

Methods: This was a cross sectional study conducted at Patan Hospital, Patan Academy of Health Sciences, Nepal. All patients coming for spirometry between June 2012 and May 2013 with the clinical diagnosis of chronic obstructive pulmonary disease were enrolled in the study.

Results: Out of 338 patients with clinical diagnosis of chronic obstructive pulmonary disease that underwent spirometry, 80 (23.7%) patients had ratio of forced expiratory volume in one second and forced vital capacity less than 70%. Out of these 80 patients, 50 (14.8%) had irreversible airway obstruction and 30 (8.9%) had reversible airway obstruction. Patient with normal spirometry findings was 258(76.3%).

Conclusions: Clinically diagnosed chronic obstructive pulmonary disease is best confirmed by spirometry for optimum management.

Keywords: chronic obstructive pulmonary disease, pulmonary function, spirometry

Plain Language Summary

The study was done to see whether the clinical diagnosis of COPD is accurate or not. The study found that most of the patient diagnosed as COPD did not have the disease on spirometry. So, diagnosis of COPD should always be aided by spirometry before starting long term treatment.
INTRODUCTIONS

According to 2008 Global initiative for chronic lung disease update, clinical diagnosis of Chronic Obstructive Pulmonary Disease (COPD) should be considered in any patient who has dyspnoea, chronic cough or sputum production, or a history of smoking. The diagnosis of COPD should be confirmed by spirometry. A cohort in 2005 and 2006 showed that almost half of the patients diagnosed to be COPD clinically did not have the disease.

This study was designed to see the pulmonary function by spirometry for patients diagnosed clinically with COPD.

METHODS

This was a descriptive cross sectional study evaluating records of patients with COPD coming for spirometry at pulmonary function test unit of Patan Hospital, Patan Academy of Health Sciences (PAHS), Nepal between June 2012 and May 2013. These patients were clinically diagnosed as COPD in outpatient department of general practice and medical department. Ethical approval was taken from the institutional review committee of PAHS. Records of all patients consecutively registered at pulmonary function test unit were analyzed. Spirometry diagnosis of COPD was defined as ratio of forced expiratory volume in one second and forced vital capacity (FEV1/FVC) less than 0.70 and reversibility as post bronchodilator change in forced expiratory volume in one second (FEV1) more than 0.20 of predicted. Microsoft Access 2007 was used to record data and statistical analysis was done using SPSS 16.0. Student's t-test and chi square test were used, p value < 0.05 was taken as statistically significant.

RESULTS

Out of 409 patients referred for spirometry, 338 patients with clinical diagnosis of COPD were evaluated while 69 patients with other diagnoses like bronchial asthma, pneumonia were excluded from the study. Out of 338 study patients, 174 (51.5%) were male and 164 (41.5%) female. Mean age was 62.7 years, range 37 to 88 years. Smokers were 291 (86.1%) and non smokers 47 (39.9%).

Out of 338 clinically diagnosed COPD patients, 80 (23.7%) had FEV1/FVC ratio less than 70% while 258 (76.3%) patients had FEV1/FVC ratio more than 70%. Out of these 80 patients, 50 (14.8%) had irreversible airway obstruction and 30 (8.9%) had reversible airway obstruction. Mean FEV1/FVC, FEV1 and FVC of patients with irreversible airway obstruction was 59.7%, 41.4% 70.0% respectively of predicted values, those with reversible airway obstruction had 59.7%, 55.04%, 65.3% respectively of predicted values and those who did not require bronchodilator had 94.2%, 59.1% and 63.1% respectively of predicted values. The differences observed in these three groups were statistically significant for FEV1/FVC (p<0.05), FEV1 (p<0.05) and insignificant for FVC (p=0.1). Similarly in male mean FEV1/FVC, FEV1 and FVC were 86.02%, 50.6%, 59.7% respectively of predicted and in female 86.1%, 59.7% and 71.1% of respectively of predicted values. The difference in values for male and female was statistically not significant for FEV1/FVC (p=0.9), FVC (p=0.9) and significant for FEV1 (p=0.02). On evaluation with non smoking status the values were 84.07%, 53.8% and 66.3% respectively of predicted values. The difference in smoker and nonsmoker was statistically significant for FEV1/FVC (p<0.05), FEV1 (p=0.02) and insignificant for FVC (p=0.9).

Table 1. Difference in spirometry results in clinically diagnosed COPD patients (n=338) in relation to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>PFT Diagnosis</th>
<th>FEV1/FVC % *</th>
<th>FEV1 % †</th>
<th>FVC % ‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Irreversible airway obstruction</td>
<td>59.5</td>
<td>37.7</td>
<td>69.9</td>
</tr>
<tr>
<td></td>
<td>Reversible airway obstruction</td>
<td>59.7</td>
<td>37.02</td>
<td>63.3</td>
</tr>
<tr>
<td></td>
<td>Normal §</td>
<td>93.6</td>
<td>54.4</td>
<td>58.6</td>
</tr>
<tr>
<td>Male</td>
<td>Irreversible airway obstruction</td>
<td>59.8</td>
<td>44.5</td>
<td>75.3</td>
</tr>
<tr>
<td></td>
<td>Reversible airway obstruction</td>
<td>94.8</td>
<td>64.3</td>
<td>68.1</td>
</tr>
<tr>
<td></td>
<td>Normal §</td>
<td>94.8</td>
<td>64.3</td>
<td>68.1</td>
</tr>
</tbody>
</table>

* p<0.9; † p<0.05; ‡ p<0.05; § Reversibility not checked
In a study done in US, it was found that spirometry use was 66% in pediatricians, 47% in family practitioners and 25% in internists.5 We found that knowledge and practice of spirometry were poor among hospital based Nigerian doctors because of unavailability of spirometry in most hospitals.5 We found that 258 (76.3%) patients with clinical diagnosis of COPD had normal pulmonary function test result. This shows mismatch between clinical diagnosis and spirometry findings. To minimize unnecessary load and misuse of spirometry tests, these patients should be rigorously screened by proper clinical tool like COPD population screening questionnaire before sending for pulmonary function test.6 In this line, US Preventive Services Task Force recommends against screening adults for COPD using spirometry following a systematic review of evidence of the benefits and harms and an assessment of the net benefit.7

A 2005 prospective cohort study in the United Kingdom assessed 125 participants with a previous clinical diagnosis of COPD. When spirometry was used to confirm the COPD diagnosis, only 61 (49%) met diagnostic criteria. Of the remaining participants, 25 (20%) had reversible airway obstruction, 5 (4%) had restrictive obstruction, and 34 (27%) had normal spirometry.2 In our study, out of total clinically diagnosed COPD, only 80 (23.7%) had airway obstruction, of which 50 (14.8%) had irreversible and 30 (8.9%) had reversible airway obstruction. The number of patient with normal spirometry in our study was 258 (76.3%) in contrast to 34 (27%) in a cohort study mentioned above.2 This raises the possibility of many patients having spirometry unnecessarily. In yet another cohort study, 184 of the 597 participants had a clinical diagnosis of chronic bronchitis or emphysema; 89 (48%) of the 184 were confirmed as having COPD with spirometry, while 95 (52%) did not meet the criteria for COPD.3 This shows that not only in our study but in other parts of the world also many COPD patients are sent for spirometry unnecessarily.

Our study also highlighted the statistically significant difference between FEV1/FVC and FEV1 for normal, reversible and irreversible obstruction after controlling the possible confounders like age, sex and smoking status. So, spirometry can be used as a very good tool for diagnosis, grading and ongoing management of disease.

**CONCLUSIONS**

Clinical diagnosis of COPD needs to be confirmed by spirometry for ongoing management. It should however not be used for screening purpose. Other better tools like COPD questionnaire should be evaluated for screening tool.

**ACKNOWLEDGEMENTS**

We would like to acknowledge Mrs Sarala Shrestha for performing pulmonary function test.

**REFERENCES**


<table>
<thead>
<tr>
<th>Smoking status</th>
<th>PFT Diagnosis</th>
<th>FEV1/FVC %</th>
<th>FEV1 %</th>
<th>FVC %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker</td>
<td>Irreversible airway obstruction</td>
<td>59.7</td>
<td>41.0</td>
<td>69.4</td>
</tr>
<tr>
<td></td>
<td>Reversible airway obstruction</td>
<td>59.0</td>
<td>43.7</td>
<td>78.2</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>92.6</td>
<td>58.0</td>
<td>62.8</td>
</tr>
<tr>
<td>Non Smoker</td>
<td>Irreversible airway obstruction</td>
<td>85.7</td>
<td>50.9</td>
<td>59.3</td>
</tr>
<tr>
<td></td>
<td>Reversible airway obstruction</td>
<td>51.7</td>
<td>28.1</td>
<td>66.0</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>65.0</td>
<td>65.0</td>
<td>102.5</td>
</tr>
</tbody>
</table>

*p<0.05; † p=0.02; ‡ p<0.09; § Reversibility not checked

Evaluation of different age group and pulmonary function test showed no statistically significant difference on age category with respect to pulmonary function test results (FEV1/FVC: p=0.3, FEV1: p=0.09 and FVC: p=0.9).

**DISCUSSIONS**

Global initiative to prevent lung disease recommends spirometry for the diagnosis of COPD.1 However, spirometry is underutilized in many parts of the world. In a study done in US, it was found that spirometry use was 66% in pediatricians, 47% in family practitioners and 60% in internal medicine.4 Another study in Nigeria stated that knowledge and practice of spirometry were poor among hospital based Nigerian doctors because of unavailability of spirometry in most hospitals.5 We found that 258 (76.3%) patients with clinical diagnosis of COPD had normal pulmonary function test result. This shows mismatch between clinical diagnosis and spirometry findings. To minimize unnecessary load and misuse of spirometry tests, these patients should be rigorously screened by proper clinical tool like COPD population screening questionnaire before sending for pulmonary function test.6 In this line, US Preventive Services Task Force recommends against screening adults for COPD using spirometry following a systematic review of evidence of the benefits and harms and an assessment of the net benefit.7

**REFERENCES**


**Table 2. Difference in spirometry results in clinically diagnosed COPD patients (n=338) in relation to smoking**

<table>
<thead>
<tr>
<th>Smoking status</th>
<th>PFT Diagnosis</th>
<th>FEV1/FVC %</th>
<th>FEV1 %</th>
<th>FVC %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker</td>
<td>Irreversible airway obstruction</td>
<td>59.7</td>
<td>41.0</td>
<td>69.4</td>
</tr>
<tr>
<td></td>
<td>Reversible airway obstruction</td>
<td>59.0</td>
<td>43.7</td>
<td>78.2</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>92.6</td>
<td>58.0</td>
<td>62.8</td>
</tr>
<tr>
<td>Non Smoker</td>
<td>Irreversible airway obstruction</td>
<td>85.7</td>
<td>50.9</td>
<td>59.3</td>
</tr>
<tr>
<td></td>
<td>Reversible airway obstruction</td>
<td>51.7</td>
<td>28.1</td>
<td>66.0</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>65.0</td>
<td>65.0</td>
<td>102.5</td>
</tr>
</tbody>
</table>

*p<0.05; † p=0.02; ‡ p<0.09; § Reversibility not checked

Evaluation of different age group and pulmonary function test showed no statistically significant difference on age category with respect to pulmonary function test results (FEV1/FVC: p=0.3, FEV1: p=0.09 and FVC: p=0.9).
Incretin System: Recent Advances in Glucagon Like Peptide-1 and Dipeptidyl Peptidase-4 Inhibitors

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ABSTRACT

The endogenous incretins, glucose-dependent insulinotropic polypeptide and Glucagon-like peptide, are peptide hormones secreted from endocrine cells in the small intestine. Glucagon-like peptide-1 stimulates insulin and suppresses glucagon secretion, delays gastric emptying, and reduces appetite and food intake, which explains the positive effect of incretin mimetics on weight. The incretins have also been shown to have a sustained improvement in glycemic control over three years. A wide range of cardiovascular benefits have also been claimed, such as lowering of blood pressure and postprandial lipids. Clinical trials with the incretin mimetic exenatide and liraglutide show reductions in fasting and postprandial glucose concentrations, and haemoglobin A1c (1–2%), associated with weight loss (2–5 kg). The most common adverse event associated with Glucagon-like peptide-1 receptor agonists is nausea, which lessens over time. Orally administered Dipeptidyl Peptidase-4 inhibitors reduce hemoglobin A1c by 0.5–1.0%, with few adverse effects and no weight gain. These new classes of anti-diabetic agents also expand β-cell mass in preclinical studies. However, long-term clinical studies are still needed to determine the benefits of incretin for the treatment of type 2 diabetes.

Keywords: dipeptidyl pedptidase-4 inhibitors, glucagon-like peptide-1 RA, glucose-dependent insulino tropic polypeptide, incretin
INTRODUCTIONS

In the 1960s, data suggested that oral glucose elicited a much greater secretion of insulin than a similar amount of glucose administered intravenously and that this potentiating of insulin secretion by the gut may be responsible for up to 70% of the insulin response to a meal. This physiologic activity was subsequently referred to as the intestinal secretion of insulin, or incretin effect. It was later found that two hormones and glucagon-like peptide-1 are responsible for the incretin effect. A key feature of glucagon-like peptide-1 action is the glucose-dependent stimulation of insulin secretion and concomitant suppression of glucagon. Thus, pharmacologic efforts to develop medications that mimic the actions of GLP-1 have become a target for improving or reversing chronic hyperglycemia. Dipeptidyl-peptidase-4 inhibitors - sitagliptin and vildagliptin are the first agents in this class to have received FDA approval, in addition to saxagliptin and linagliptin.

The Antidiabetic Actions of Incretin Hormones: As knowledge of the pathophysiologic mechanisms of diabetes mellitus has increased, clinical attention has shifted to the incretin system. Hormones secreted from gastrointestinal endocrine cells play key roles in the control of energy balance by regulating the assimilation, storage, and metabolic processing of nutrients. Disruption of these endocrine cells disturbs the normal control of insulin production and body weight, contributing to the development of Diabetes Mellitus Type 2. Two incretin hormones, GLP-1 and GIP, are vital to the control of glucose homeostasis through their ability to increase the β-cell insulin response to ingested glucose. These hormones are responsible for more than 90% of the incretin effect observed after glucose ingestion. GLP-1 and GIP are released within minutes of glucose absorption to increase insulin secretion. GLP-1 is synthesized in L-cells in small bowel and colon, whereas GIP is secreted by K-cells in the duodenum and proximal jejunum. Both GLP-1 and GIP trigger insulin trophic actions by binding to β-cell receptors. GLP-1 receptors are primarily expressed on pancreatic glucagon-containing α, β and δ cells, though they are also widely expressed in the central and peripheral nervous system, lung, heart, and gastrointestinal tract. GLP-1 and GIP exert multiple biological effects. The metabolic effects of GLP-1 include: inhibiting glucose-dependent glucagon secretion from α cells; increasing β-cell proliferation and decreasing β-cell apoptosis; slowing gastric emptying; increasing CNS-mediated satiety leading to reduced food intake; indirectly increasing insulin sensitivity and nutrient uptake in skeletal muscles and adipose tissue; and exerting neuroprotective effects. The metabolic effects of GIP include, in addition to increasing insulin secretion, the following: inhibiting gastric acid secretion; bio-regulating fat metabolism in adipocytes; increasing glucagon secretion; increasing β-cell replication; and decreasing β-cell apoptosis. Under normal physiologic conditions, fasting plasma glucose (FPG) is managed by tonic insulin and glucagon secretion, but excursions of post prandial glucose are controlled by insulin and the incretin hormones. Several key pathologic abnormalities characteristic of T2DM appear to be related to the biologic activities and functions of incretins. Patients with T2DM have impaired incretin function, impaired GLP-1 release, diminished insulinotropic response to GIP, glucoregulatory defects, and impaired glucose homeostasis. Table 1 lists the effects of GLP-1 and GIP on defects in glucose metabolism, pancreas function, and energy uptake in patients with T2DM. Importantly, the incretin effect in particular, postprandial production of GLP-1 is impaired in patients with T2DM. The insulin-secretory response, however, can be restored with pharmacologic doses of GLP-1.

Table 1. Action of incretins GLP-1 and glucose dependent insulotrophic polypeptide on pathophysiologic defects in patients with type 2 diabetes mellitus.

<table>
<thead>
<tr>
<th>Defects in Type 2 Diabetes</th>
<th>Action of Incretins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impaired glucose stimulated insulin secretion and first phase response</td>
<td>Restoration of glucose dependent insulinotropic effect and lack of postprandial biphasic response</td>
</tr>
<tr>
<td>Hyperglucagonemia</td>
<td>Suppression of glucagon secretion</td>
</tr>
<tr>
<td>Defective hypoglycaemia counter regulation</td>
<td>Glucagon secretion and loss of insulinotropic effect, when plasma glucose is low</td>
</tr>
<tr>
<td>Reduced beta cell mass and insulin content</td>
<td>Increased synthesis of proinsulin, possible increased beta cell mass or differentiation of islet precursor cells into beta cells</td>
</tr>
<tr>
<td>Accelerated beta cell apoptosis</td>
<td>Possible inhibition of toxin induced beta cell apoptosis</td>
</tr>
<tr>
<td>Normal retarded or accelerated gastric emptying</td>
<td>Slowing of gastric emptying</td>
</tr>
<tr>
<td>Hypercaloric energy intake, obesity</td>
<td>Suppression of appetite/increase satiety, weight loss</td>
</tr>
</tbody>
</table>

Incretin-Based Treatment Options: Glucagon-like peptide-1 is rapidly metabolized by the enzyme DPP-4, resulting in the generation of an inactive compound that makes for a nonviable therapeutic agent. As a result, a number of GLP-1 homologs (exenatide and lixisenatide) or analogs (liraglutide, dulaglutide, and albiglutide), and inhibitors of DPP-4 (sitagliptin, vildagliptin, linagliptin and saxagliptin) have been developed as options for treating patients with T2DM. GLP-1 receptor agonists can produce GLP-1 levels that are more than five times a patient’s physiologic levels, and DDP-4 inhibitors result in an approximate two-fold increase in GLP-1 levels.
GLP-1 Receptor Agonists Exenatide (synthetic exendin-4): Its first incretin-related therapy available for patients with type 2 diabetes. It is naturally occurring peptide from the saliva of the Gila monster and has an approximate 50% amino acid homology with GLP-1. It binds to GLP-1 receptors and mimics many properties of GLP-1. GLP-1 is degraded within one to two minutes by DPP-IV within one to two minutes of entering the circulation. But exenatide is resistant to DPP-IV inactivation. Moreover, it is >1000 times more potent than GLP-1 in circulation. It does not stimulate gastric acid secretion or trigger hepatic vagal efferent. Following injection, it is measurably present in plasma for up to 10 hours and therefore suitable for twice a day administration by subcutaneous injection. Exenatide is excreted renally so, it is contraindicated in patients with decreased creatinine clearance (CrCl <30 mL/min) or with end-stage renal disease (ESRD). Exenatide is excreted renally so, it is contraindicated in patients with decreased creatinine clearance (CrCl <30 mL/min) or with end-stage renal disease (ESRD).

Most recently, a multicenter placebo-controlled trial, evaluated the safety and efficacy of twice-daily exenatide in patients whose T2DM was uncontrolled with insulin glargine, with or without oral antihyperglycemic agents. Patients receiving exenatide (n=138) had a mean HbA1c reduction of 1.74%, compared to 1.04 % in patients receiving placebo (n=123) (between-group difference, -0.69; 95% confidence interval (CI), -0.93% to -0.46%; p<.001). Body weight decreased by an average of 1.8 kg with exenatide and increased by an average of 1.0 kg with placebo (between-group difference, -2.7 Kg; 95% CI, -3.7 Kg to -1.7 Kg; p<.001). The incidence of minor hypoglycemia was similar between the two groups. The rates of hypoglycemia observed in patients taking exenatide are largely dependent on the agents with which it is combined. However, patients receiving exenatide experienced higher rates of gastrointestinal adverse effects compared to those receiving placebo.

Two clinical studies of exenatide (5 μg or 10 μg once daily) demonstrated mean increases in the fasting blood glucose concentrations and HbA1c after once weekly administrations of exenatide LAR for 15 weeks compared with exenatide twice daily. A recent study comparing 2 mg preparation of exenatide –LAR given once weekly with conventional glargine, with or without oral antihyperglycemic agents. Patients receiving exenatide LAR in 45 patients with type 2 diabetes indicates a much greater reduction in fasting glucose concentrations and HbA1c relative to baseline. However, the extent of this reduction was significantly greater for liraglutide (p<0.001). Treatment-associated nausea declined with time for both study arms but persisted longer in patients treated with liraglutide. Analysis across the available LEAD studies shows a consistent improvement in HbA1c levels with liraglutide (1.0% to 1.6%), and a very low incidence of hypoglycemic episodes. In addition, liraglutide treatment was associated with sustained weight loss, systolic blood pressure reduction, and improved β-cell function.

There have been reports suggesting that both treatments with exenatide and liraglutide, the most common GLP-1 receptor agonists, are associated with an increased risk of pancreatitis. As chronic pancreatitis is also a known risk factor for pancreatic cancer through cytotoxicity....

Liraglutide: Liraglutide is a GLP-1analogue with 97% sequence identity to the human hormone. Liraglutide contains a single amino acid substitution relative to endogenous GLP-1 and is linked to a fatty acid chain, resulting in slow absorption into circulation, increased reversible albumin binding, and reduced susceptibility to DPP-4. These effects extend liraglutide’s benefits, increasing its plasma half-life to 11 to 15 hours. With maximal concentration after eight to twelve hours, Injected once daily, at any time of day, irrespective of meals, liraglutide reduced fasting blood glucose and glyceric excursions associated with all meals.

In LEAD-1, LEAD-2, and LEAD-4, researchers tested the use of liraglutide combined with glimepiride, metformin, or metformin and rosiglitazone, respectively. These combination regimens reduced mean HbA1c levels by more than 1% over 26 weeks. In LEAD-5, once-daily liraglutide was compared directly with insulin glargine in patients receiving concomitant metformin and glimepiride. Liraglutide led to significantly lower HbA1c levels compared with glargine (p=0.0015). As is commonly observed following transition to insulin, patients starting glargine gained weight. Convercely, those administered liraglutide lost weight, with a difference of 3.5 kg at study’s end. The final LEAD study, LEAD-6, offers a head-to-head comparison between the two GLP-1 receptor agonists. In this study, liraglutide and exenatide both significantly reduced HbA1c levels relative to baseline. However, the extent of this reduction was significantly greater for liraglutide (p<0.0001). Treatment-associated nausea declined with time for both study arms but persisted longer in patients treated with exenatide. Analysis across the available LEAD studies shows a consistent improvement in HbA1c levels with liraglutide (1.0% to 1.6%), and a very low incidence of hypoglycemic episodes. In addition, liraglutide treatment was associated with sustained weight loss, systolic blood pressure reduction, and improved β-cell function.

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of inflammatory cytokines, reactive oxygen species, and proliferation, there might be an increased risk of pancreatic cancer as well. It has also been observed in preclinical studies that incidence of thyroid C-cell tumors was increased in rodents treated with GLP-1 analogs. Therefore, monitoring for thyroid cancer has been a focus in the clinical development plans of all DPP-4 inhibitors and GLP-1 receptor agonists, but thus far the data have been reassuring.

**Taspoglutide:** Another extended release molecule works on a once weekly basis promising results in phase 2 studies. Taspoglutide has a 93% homology to endogenous GLP-1. The development of taspoglutide was recently discontinued because of hypersensitivity concerns, an effect that has not been seen with any of the other approved or experimental GLP-1 mimetics.

**Albiglutide:** It is a human GLP-1 receptor agonists with two molecules of GLP-1 linked to albumin. The half life is about five days making once weekly dosing possible. In phase 2 trials, HbA1c reduction observed after 16 weeks were similar for dosages 30 mg weekly, 50 mg bi-weekly and 100 mg monthly.

**DPP4 Inhibitors:** Oral DPP4 inhibitors increase the availability of endogenous GLP-1, thus enhancing glucose-induced insulin secretion and inhibiting glucagon release. These agents have no effect on gastric emptying, and do not affect body weight.

**Sitagliptin and Vildagliptin:** Sitagliptin and vildagliptin are the first agents in this class to have received FDA approval. Sitagliptin is potent, highly selective, reversible and competitive inhibitor of DPP-4 enzyme and exerts its anti-hyperglycemic effect by slowing the inactivation of incretin hormones. Sitagliptin has been associated with an approximate two-fold increase in postprandial GLP-1 plasma concentrations, compared to placebo in healthy human study participants and in patients with T2DM. A comprehensive meta-analysis of trials of once-daily sitagliptin (available in Canada and elsewhere) or twice-daily vildagliptin (marketed in Europe) concluded that these agents were well tolerated, although infections including nasopharyngitis, upper respiratory tract infections, and urinary tract infections, were significantly increased with sitagliptin (relative risk 1.15 compared with placebo 95% confidence interval 1.02 to 1.31; p<0.03). They are indicated as monotherapy and in combination with metformin, thiazolidinedione (TZD) and insulin. Headache was reported for both drugs but was more common in patients taking vildagliptin.

Because sitagliptin is cleared by the kidneys, dosage adjustments are recommended in patients with moderate to severe renal insufficiency and in patients undergoing dialysis. For patients with moderate renal insufficiency (CrCl 30-50 ml/min), the sitagliptin dose should be reduced to 50 mg. For patients with severe renal insufficiency (CrCl <30 ml/min) or end-stage renal disease, a sitagliptin dose reduction to 25 mg is indicated. Vildagliptin is not recommended for use in moderate renal failure.

**Saxagliptin:** Saxagliptin is another DPP-4 inhibitor approved by FDA for the treatment of patients with T2DM. It is a potent, reversible, competitive agent that selectively inhibits DPP-4. As with sitagliptin, saxagliptin exerts its glucoregulatory actions through prevention of incretin degradation, leading to potentiation of GLP-1 and GIP action. The efficacy of saxagliptin has been studied as monotherapy and in combination with metformin, sulfonylureas, and TZDs. During 24 to 102 weeks of treatment with saxagliptin, glycemic efficacy has been demonstrated in patients with T2DM regardless of age, gender, race/ethnicity, or body weight. When used as monotherapy, saxagliptin 5 mg once daily produced mean HbA1c reductions of 0.5% to 0.7%. When used in combination with traditional oral hyperglycemic agents, saxagliptin 5 mg once daily (as add-on therapy or as initial combination therapy) provided clinically important reductions in HbA1c level. Saxagliptin, when used with metformin, produced mean reductions in HbA1c levels of 0.7% to 2.5%, when used with a sulfonylurea, HbA1c mean reduction was 0.6% 60; and when used with a TZD, HbA1c mean reduction was 0.9%. The usual dose of saxagliptin is 2.5 or 5 mg once daily, with 2.5 mg dose recommended for patients with moderate to severe kidney disease (CrCl <50 mL/min) and for patients taking strong CYP3A4/5 inhibitors, such as ketoconazole. The most common adverse events observed with saxagliptin are similar to those of sitagliptin, such as headache, nasopharyngitis, upper respiratory tract infections, and urinary tract infections.

**Linagliptin:** In May 2011, linagliptin became the latest DPP-4 inhibitor to be approved by the FDA for the treatment of patients with T2DM. Similar to sitagliptin and saxagliptin, linagliptin is a potent, highly selective, DPP-4 inhibitor. In approximately 4000 patients with T2DM in clinical trials, linagliptin as monotherapy or in combination with other oral antihyperglycemic drugs was generally well tolerated, with a low incidence of hypoglycemia. The usual dose of linagliptin is 5 mg once daily. No dose adjustment is needed in patients with renal or hepatic impairment. Inducers of CYP3A4 (eg Rifampin) may decrease the efficacy of linagliptin. Therefore, patients requiring such drugs should receive an alternative to linagliptin.
GLP-1 Receptor Agonists versus DPP-4 Inhibitors: Various similarities and differences exist between GLP-1 receptor agonists and DPP-4 inhibitors. Among the differences between these two drug classes, GLP-1 receptor agonists are administered via subcutaneous injection, while DPP-4 inhibitors are delivered as oral tablets. Glucagon-like peptide-1 receptor agonists are probably more effective than DPP-4 inhibitors at reducing HbA1c levels (Table 2). Glucagon-like peptide-1 receptor agonists help preserve β cells, which are diminished with DPP-4 inhibitors; induce weight loss, unlike DPP-4 inhibitors; and have beneficial effects on blood pressure that, have not been demonstrated with DPP-4 inhibitors.

FUTURE DEVELOPMENTS

Many new incretin-based agents are under investigation for the treatment of patients with T2DM. Albiglutide, exenatide LAR, and lixisenatide are investigational GLP-1 receptor agonists in late stages of clinical development. Liraglutide and exenatide are first-generation GLP-1 receptor agonists, requiring once or twice daily parenteral administration, respectively. Much effort continues to be directed towards improvement of the pharmacokinetic profile of GLP-1R agonists, to minimize peak levels of the drug and thus reduce the extent of nausea. Longer-acting GLP-1R agonists should ideally provide more uniform and sustained GLP-1R activation over a 24-h period, but require less frequent administration.

CONCLUSIONS

The treatment of patients with T2DM remains complex and challenging for physicians. Because GLP-1 receptor agonists work in a glucose-dependent manner, they are likely to reduce hyperglycemia safely, without a marked fluctuation toward hypoglycemia. In the process of acutely restoring β-cell function, GLP-1 agonists may allow patients to achieve HbA1c <7%, without experiencing weight gain or hypoglycemia. These incretin-based medications demonstrate improved efficacy and safety relative to traditional agents, and they represent a major paradigm shift in the treatment of patients with diabetes mellitus and might be considered as first-line therapy after metformin, and insulin therapy (mainly long-acting analogs) could be added if A1C is not at target, mainly when fasting or pre-prandial glucose levels are high. The safety of constant DPP-4 or GLP-1 therapy over time is not yet fully clear. Presently, the benefits of using DPP-4 inhibitors or GLP-1 receptor agonists for treatment of type 2 diabetes outweigh the risks. Nonetheless, their safety profile should be monitored and their indications should be widened cautiously.

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Perforated Jejunal Diverticulum - an Unusual Presentation

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ABSTRACT

Jejunal diverticula are rare and usually asymptomatic. Acute complications may include haemorrhage, diverticulitis, obstruction, abscess formation and perforation.

Here we report a case of 61 years lady who presented with generalized abdominal pain, vomiting and fever. There were features of acute peritonitis on examination. Exploratory laparotomy revealed a perforated jejunal diverticulum. Resection of the jejunal segment containing the perforated diverticulum and primary anastomosis was done. Histopathological examination revealed jejunal diverticulum with pinhole perforation.

Keywords: acute abdomen, diverticular perforation, jejunal diverticulum, small bowel diverticular disease
INTRODUCTIONS

Jejunal diverticula are rare clinical entities. The majority of cases are asymptomatic. Only a few cases present with chronic non-specific abdominal symptoms and acute complications, including haemorrhage, intestinal obstruction, diverticulitis and perforation. Because of the rarity of the disease and its complications, diagnosis is difficult and delayed. We are presenting a rare case of perforated jejunal diverticulum.

CASE REPORT

A 61 years lady with abdominal pain of three days and two episodes of vomiting presented to the emergency department of KIST Medical College, Kathamandu, Nepal. She was ill looking, dehydrated and febrile (101°F) with heart rate of 110 bpm, blood pressure of 90/50 mmHg. There was generalized abdominal tenderness, more prominent at right iliac fossa. White cell count was elevated (16 × 10⁹/L) with neutrophils 87%. Other laboratory tests were normal. Supine abdominal X-ray displayed multiple dilated loops of small bowel. Chest X-ray revealed free gas under diaphragm. Ultrasonography of abdomen showed dilated small bowel with minimal pelvic collection. Patient was resuscitated (intravenous fluid, antibiotic Ceftriaxone and Metronidazole, Foley catheterization) for emergency laparotomy with diagnosis of appendicular perforation.

Intra-operative findings revealed a solitary jejunal diverticulum of 5×5 cm² with pinhole perforation (Figure 1) at two feet from the duodeno-jejunal flexor, swollen appendix and minimal amount of pus in the peritoneal cavity. Appendectomy, segmental resection of the jejunum and primary jejuno-jejunal anastomosis were carried out. Peritoneal lavage was done with warm normal saline and abdomen was closed with tube drains in pelvis and in vicinity of anastomosis. Histopathology revealed the jejunal diverticulum with pinhole perforation (Figure 2). She made an uneventful recovery and was discharged on the 9th post operative day.

DISCUSSIONS

Our patient was diagnosed with perforated appendix and underwent laparotomy. Only during surgery we found perforated jejunal diverticulum. The diagnosis of complicated or uncomplicated jejunal diverticulitis is seldom made before exploratory laparotomy or diagnostic laparoscopy. Small bowel diverticula are rare. These diverticula are classified as acquired diverticula. They are formed by herniation of mucosa and submucosa through the muscular layer of the bowel wall and are usually multiple, arising on the mesenteric border where the arteries enter the intestine, contrary to the true congenital Meckel’s diverticulum. Their size varies from a few millimetres to more than 10 cm and they occur in greatest number in the oral part of the small bowel and they also tend to be larger. In our case also, the diverticulum was originating on the mesenteric border of the jejunum and was 5 cm in size with perforation at tip. The predominance of diverticula in the jejunum is attributed to the greater diameter of the penetrating jejunal arteries.

Acute complications like infection, haemorrhage, obstruction and perforation require prompt management. Most frequent acute complication of the jejunoileal diverticula is diverticulitis with or without perforation, occurring in 2.3% to 6.4% of cases. Complications or symptoms requiring surgery have been reported to occur in up to 10%. Chronic symptoms include abdominal pain, nausea, vomiting, flatulence and diarrhoea or malabsorption, but these are non-specific. The incidence of jejuno-ileal diverticula is reported to be 0.5% to 2.3% in small-bowel contrast studies and 0.3% to 4.5% in autopsy studies. Owing to their mesenteric location, they may frequently be overlooked at operation and autopsy.

Jejunal diverticulosis, unlike colonic diverticulosis is not associated with surrounding diverticulitis as we found intra-operatively (Figure 1) and was confirmed on histopathological report (Figure 2).

The elderly woman in our case with rare disease of jejuno-ileal diverticula presented with acute perforation peritonitis and was successfully managed with resection anastomosis during emergency laparotomy.
REFERENCES


Ruptured Uterus Requiring Emergency Hysterectomy for Saving Mother

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ABSTRACT

A 26 years woman with G3P2L0AO at 40 weeks and 6 days of gestation, but no antenatal clinic visit history presented to Gynecology and Obstetrics out patient clinic complaining decreased feeling of fetal movement since 2 days. Ultrasonography examination revealed fetal demise with amniotic fluid volume of 28 cm. Emergency lower segment caesarean section for ante partum hemorrhage was done. A vertical rupture of the posterior aspect of the uterus from fundus upto the level of cervix with hemoperitoneum of two liters was detected. A macerated dead fetus weighing 3.5 Kg was lying in the peritoneal cavity and the placenta was already partially separated. The mother after hysterectomy was treated in ICU for two days with antihyperglycemic agent additionally and discharged.

Keywords: hemoperitoneum, hysterectomy, misoprostol, rupture uterus
INTRODUCTIONS

A cesarean hysterectomy is very different from a non-pregnant hysterectomy. It is uncommon emergency, life-threatening conditions that are stressful to everyone involved.\(^1\)

Uterine rupture (UR) during pregnancy is a rare obstetrics complication. Spontaneous rupture can occur in previously scared uterus following curettage, manual removal of placenta, grandmultipara, congenital anomaly. Latrogenic rupture may occur with the use of oxytocin, prostaglandins/misoprostol, forcible external version or trauma. Rupture of the uterus occurs in 1 per 15000 deliveries. Unscarred uterine rupture during pregnancy is 1 (0.0033%) per 30,764 deliveries.\(^2\) Overall incidence of pregnancy related uterine rupture is 1 (0.07%) per 1,416 pregnancies.\(^3\)

CASE REPORT

In June 2013, a 26 years woman presented to Gynecology and Obstetrics out-patient clinic complaining decreased feeling of fetal movement since 2 days. Obstetric history was gravida 3 para 2 with no living issue and 40 weeks plus 6 days of gestation. She had no antenatal clinic visit history. Ultrasonography (USG) examination showed intrauterine fetal demise with amniotic fluid volume of 28 cc. Her general condition was fair and the vital signs were within normal limit. On examination per abdomen, uterus was term size with cephalic presentation, head of the fetus was 4/5 palpable with no contraction. On vaginal examination, the cervical os was 1.5 cm soft, posterior, uneffaced, membrane intact, head of the fetus at -2. The patient and her husband were counseled regarding fetal demise based on the USG report, explained the necessity of induce labor to prevent further risk to the mother. Induction of labor with misoprostol in two doses of 25 ug per vaginal at 4 hours apart was given. During reassessment, after 4 hours, cervical os was 3 cm, cervix 50% effaced and planned to observe for further progress.

However, in two hours, the patient was found drowsy with blood pressure 90/50 mmHg. Her random blood sugar was 812 mg/dl. On abdominal examination, the uterus was tensed-up with free head of the fetus. On vaginal examination, the cervix was posteriorly pulled up and head of the fetus was felt high up. At the time, fresh blood was coming out from the cervical os. Then, as indicated, an emergency surgery was decided considering the case as ante partum hemorrhage with possibility of placental abruption. Diabetic ketoacidosis was ruled out and medical consultation was sought to involve physicians to manage high blood sugar and hypotension. Intraoperative findings revealed two litres of blood in peritoneal cavity and vertical rupture of the posterior aspect of the uterus from fundus down to cervix extending laterally towards the right tuboovarian vessels. A macerated male dead fetus weighing 3.5 Kg was lying in the peritoneal cavity with head still within the uterus with placenta partially separated. Due to active bleeding, repair was not possible and the obstetrics team proceeded for hysterectomy after consent from her husband. The left tube and ovary was conserved. Four pints of blood was transfused during the operation due to blood loss. Then, the patient was treated in ICU. Hematocrit was 18%. Insulin was administered at 1 unit/hour for 2 days while ICU stay. Blood sugar monitoring was done six hourly. Then the patient was transferred to the general gynae/obstetrics ward and treated with insulin 50:50 12 units before meals and metformin 500 mg orally twice daily.

Patient was discharged after 13 days with metformin 500 mg and advised to come for follow-up after one week. But she didn’t come for follow-up.

DISCUSSIONS

Uterine rupture is a severe obstetric complication. Rupture of the pregnant uterus is a major obstetric complication that occurs often with no warning signs. Uterine rupture is a potential complication for patients with non-scarred uterus as well as scarred uterus.\(^4\)

The choice of surgical procedure depends upon the type, extent and location of the rupture as well as the patient’s condition and desire to preserve her child bearing capacity. A retrospective study of uterus rupture, after 28 weeks of pregnancy, for the period of 20 years from 1985 to 2005 A.D. admitted in Prashuti Griha (Maternity Hospital), Nepal was carried out. In 20 years review, data indicated that 251 cases with ruptured uterus were admitted. Padhye reported that the total incidence of RU in her study was 1:1100 deliveries (0.09%) in mostly unbooked (app. 73%) patients. On the total, 70% (n=175) was complete rupture, incomplete rupture (n=64) 25% and “no mention” in 5% (n=12) cases.\(^5\)

The incidence of unscarred uterus was reported in 1996 ref. The rupture of unscarred uterus appear to occur more frequently in less developed countries due to high parity, long labor. Uterine rupture due to use of misoprostol has been reported but incidence of this type is reported. Diagnosis is made by non reassuring fetal heart rate pattern, cessation of contractions, loss of station, tenderness, vaginal bleeding, maternal tachycardia, shock.\(^2\) In this case, there was loss of station with vaginal bleeding. According to meta-analysis done...
from 25 studies from 1976-2012, the rate of spontaneous rupture of unscarred uterine in developed countries was 1 per 8,434 pregnancies (0.012%). The rupture of uterus and expulsion of fetus into the peritoneal cavity, perinatal mortality rate was reported 74-92% and maternal mortality rate 1-13%. Repair is mostly applicable where the margins are clean and is done by excision of the fibrous tissue. Repair and tubal sterilization is mostly done with a clean-cut scar rupture with completed family history. In the case of complete rupture, 10-20% required hysterectomy for hemostasis.

REFERENCES

Clinical skills Lab: A Need in Nepalese Medical School

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ABSTRACT

Medicine of present world demands high level of competency in both clinical examination and performing a procedure in patients. The traditional methods of bedside skill learning and teaching should be supplemented by instruction in clinical skills lab of basic important clinical skills. Every medical school should work towards establishment and incorporation of clinical skills lab in basics science subjects and clinical posting along with other subjects to make it Practice oriented and Student centred learning.

Keywords: clinical skills Lab, curriculum, medical education

INTRODUCTIONS

Medical education in Nepal begin with establishment of ayurvedic school in 1933 followed by Civil Medical School for “basic level” health worker in Kathmandu. However advanced training started with MBBS studies in 1978 and post graduation training in 1982 under Institute of Medicine, Tribhuvan university. The opening of new medical schools has helped in production of health manpower at start of 21st century. The majority of these medical school follow traditional classroom lecture along with bedside teaching and lately problem based learning has been started as method of teaching learning activities.

The three learning principle” knowledge, attitudes and skills” in medical education, are acquired thorough bedside teaching, lectures, demonstration, audiovisual presentation, role play. Historically, clinical skills were learned through observation of different procedure for certain period or set number of cases followed by performing same procedure under supervision. In one of studies done among medical students in Nepal, 25% of students were not satisfied with the clinical skills acquire during undergraduate education so that they are not self assured in starting a residency programme. Hence clinical skills lab can enrich, supplement, expedite and bridge these learning activities during medical training.
Clinical skills lab along with traditional bedside teaching using modern audiovisual aids are fundamental part of undergraduate curriculum development and medical education throughout world in present context and we should also incorporate basic clinical skills lab facilities in our medical education using our own resources for transition to modern medicine.

PRESENT SCENARIO IN NEPAL

Nepal Medical Council, an autonomous regulatory body for monitoring Medical education in Nepal, in its publication “Accreditation Standards for MBBS” has laid specific criteria to achieve “The competencies of the MBBS Graduate”. The guidelines mandates competency of graduates in clinical skills, communication skills, research, population health and health system, ethics and information management and instructed all the medical college to include in undergraduate curriculum.

Medical student after graduation from medical school, should able to perform basic clinical skills and procedure independently at primary health care setting in any clinical scenario that should leads to early and accurate diagnosis and patient management. This vision led to incorporation of clinical skill lab training as integral part of medical education in the revised 2008 curriculum of Institute of Medicine.

The Institute of Medicine, Tribhuvan University Teaching Hospital has started clinical skills lab in 2008 at Maharajgunj Medical Campus, which is equipped with manikins, models and equipments required to train the basic clinical skills. The Skills Lab runs through administrative efforts of National Centre for Health Professions Education (NCHPE), situated at Mohego building. Under guidance of Nepal Medical Council and using the 2008 curriculum of Institute of Medicine, Tribhuvan University as a reference, many other Medical Colleges have initiated towards or already implementing clinical skills training for their students.

CLINICAL SKILLS LAB

Clinical skills lab teaches history taking, physical examination, investigation skills, logical diagnostic approach, medical value, team concept and close loop feedback using effective communication with used of simulators, manikins, simulated patients and case scenarios under the guidance of teacher. Clinical Skills Lab is designed for teaching and assessing learners at different level of skill, experience and expertise in controlled and safe environment, according to individual needs. To successfully train and achieve the goal of practiced oriented and student focussed learning, Institute of Medicine has mandated the rotation of students through clinical skills lab during second year of medical school, junior internship and at start of internship.

According to the curricula of Institute of Medicine, the important skills that student will learn in skills lab are clinical skills (rectal examination, Ear examination, gynaecological examination and auscultation of heart sounds and breath sounds) and procedural skills (cardiopulmonary resuscitation and intubation in neonate, child and adult, peripheral and central venous access, ECG interpretation, umbilical catheterization in neonate, pleural aspiration and insertion of chest tube, wound closure, universal precautions).

Clinical skills lab not only nurtures clinical skills, but also aid in imposing theoretical book knowledge of clinical medicine into clinical practice which is indispensable in patient management either at an outpatient clinic or during inpatient ward posting.

The importance of clinical skill laboratory can be evaluated and defined from Students, Patient and Physician perspective. Students have to learn much procedure in short time or many times they may not even get a chance to perform some procedure due to large number of students in a group or a change in pattern of patient management from inpatient to outpatient, as result many students will begin internship training with minimum skill. Those issues can be overcome by integrating skills lab as a part of learning, which will help to enter internship with greater skill, experience, confidence and also reduces stress of internship. A number of other issues revolving around the patient including shortening of hospital stay, ethical issues of practicing in real patients, and rights of patient can also limit the learning process. Despite of these setbacks, it is important to note that the integration of patient in medical educational process will teach students patient management, working in a team for a goal, ethics, interpersonal relationship and communication skills which will ultimately improve the clinical competence of students. A Physician overburden in clinical work may not able to devote his time for skill teaching at bedside or even at outpatient clinics, which definitely hampers clinical competence in students and one of the solution to these issues could be establishment of clinical skill lab.

ESTABLISHMENT OF CLINICAL SKILLS LAB

The cost of establishment of clinical skill lab will be higher for developing countries like ours, as expensive instrument has to be imported with added administrative and logistic cost, maintenance cost, added cost for space.
and permanent staff dedicated to operation of facilities. In addition there must be continuing medical education and training facilities for faculty. Therefore, we must use local and socially acceptable available resources along with judicious use of imported simulation instrument to teach our students.

WHEN TO INCLUDE

The Clinical skills lab can be included in preclinical years, clinical years with rotation, internship, residency training program and also as a part of continuing medical education.

During Preclinical year students are learning basic sciences and aren’t exposed to patient directly and inclusion of skills lab during this period will bring better outcomes basic science course along with marked improvement in clinical skills, communication skills, acquiring patient medical history and physical examination. Performance standard of students, assessed with Objective Structural Clinical Examination(OSCE) , who learned in skills lab in addition to traditional learning throughout medical school was significantly higher in comparison to student who were taught in skills lab in final year followed by 12 month internship. This demonstrate the importance of clinical skills lab in clinical years.

The skills acquired through the clinical skill lab and its application in management of real patients has remained a subject of debate and further research. A recent randomized controlled trail found that those students who were trained in skills lab are more professional, can perform procedure faster, had better communication skill and provided overall better medical care which reinforce a previous systematic review which concluded that skills laboratory training improves procedural skills. This article also highlighted that most of prior studies did not assess application of skill learn from skill lab in real patient in a clinic or hospital setting.

In conclusion the clinical skill lab is supplementary to traditional bedside teaching in undergraduate teaching and we should work towards building a clinical skills lab that is best suited for locally available resources and most importantly dedicated to educate our students.

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Traditional Healing Practices in Rural Nepal

Richa Baniya

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ABSTRACT

Traditional healing practices in rural Nepal has emerged together with its culture and tradition. In the rural areas traditional culture is still predominant and western allopathic medicine has yet to reach those areas. People of rural societies are reluctant to accept changes in their cultural practices. There are also a lot of factors that make people choose traditional healers in lieu of modern hospital/heath post services. However, modern health services are slowly replacing traditional healing practices in rural parts of Nepal.

Keywords: dhami/jhankri, healing, prevalent, traditional

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People of primitive societies were mainly dependent on the nature for survival and believed nature to be their mother. When natural calamities struck their surrounding environment, they interpreted them as ‘God’s Anger’. When people became sick, they couldn’t explain it rationally and believed it as the ‘Curse from the Gods’ or ‘The Punishment of the People’s Sins’. So, people started to worship rivers, forests, mountains, etc. as God. Likewise, people assumed the physical body of a person would die but not their inner soul. So, they started worshipping the soul of their deceased ancestors as ‘Kul-Debta’. This belief was passed from generation to generation.

The concept of witch or ‘Bokshi’ developed simultaneously with this notion. A witch is supposed to keep ghosts with her and orders it to enter a person’s body, at first, causing minor illness, progressing towards severe condition and finally death. To get rid of it, faith healers were introduced. They were called ‘Dhami or Jhankri. They were believed to act as mediator between the spiritual world and the material world and suck the offending spirit from sick person’s body.

As human beings advanced, they became more intellectual. They started to understand that lack of sanitation was the cause of illness. They started to use cow dung to clean their house every day and used cow urine as an antiseptic. They bathed everyday and rooted it in their culture. Some people became vegetarians as meat could cause various diseases. To prevent illness they took proper diet, fruits and even embedded them in their culture, E.g. intake of curd mixed with beaten rice is supposed to keep them cool, and a specific day, during summer, was created to take it.

Being a medical student, it is important to know how traditional healing operates. These deep-rooted traditions have beliefs that can lead a person even towards death, e.g. a traditional belief that people suffering from diarrhea must not be given water/fluid. If we know the traditional practices of treatment, then we can make people aware of the risks of these treatment methods. We will also know where to intervene and also tell people the benefits of modern health facilities and encourage them to utilize those facilities. Nowadays, due to cultural transformation, even Dhamis have started to recommend patients to hospitals in case of emergency.

The practice of traditional healing in Nepal is gradually decreasing these days. Modern medicine was introduced in the seventeenth century but became dominant only during the last fifty years. Some years ago, even the case of snake bites was carried to Dhami/Jhankris but now patients of this case prefer going to health posts. However, due to lack of modern health facilities, in most parts of the rural areas, people still visit traditional healer. Mostly, due to the cultural beliefs people are psychologically convinced that, if they are treated by the traditional healers, they get well soon. People of rural societies don’t easily accept the scientific innovation. Their culture has created a deep faith in traditional healers.

Educated people now believe that traditional healers treat the sick people only psychologically. Sometimes the illness might also be only psychological. In this case, the traditional healers will help to make the person psychologically stronger. Even today, in rural society traditional healers are practicing their jobs and somehow they are successful in treating people. Whether psychological or not is yet unknown, because I have myself witnessed, a healer calm down a baby, crying for hours, just by chanting his Mantras without touching her. There was no rationality behind it nor it was any trick, but it happened.

The Dhami/Jhankri has no qualifications. They could be either literate or illiterate. They learned the treatment methods from their parents or by being disciples of senior Dhamis. Some Dhamis even say tales of being trained by the people of the jungle for several days to become a healer. However, people trust them and visit them mainly because it has been their cultural practice and are cheaper and available when needed. Being a part of the culture, is what makes traditional healing special.

REFERENCES

Reflection on Peer Assisted Learning at PAHS

Anil KC, Sandesh Karki
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ABSTRACT

Peer tutoring is an organized learning experience in which one student serves as the teacher or tutor, and one is the learner or tutee. Peer-teachers and their students share a similar knowledge base and learning experience, which allows the peer-teachers to use language that their learners understand and to explain concepts at an appropriate level. Peer-teachers and student-learners also share a similar social context because of their similar social roles, and because of this, student learners feel more at ease with a peer teacher than with a senior clinician. Peer tutoring is a beneficial way for students to learn from each other in the classroom and in small groups, so benefit is not only for the tutee but also to the tutor, predominantly through the development of their own clinical and teaching skills and from the positive feedback obtained by their tutees, thus creating a highly pleasant learning atmosphere and a win-win situation for all.

Keywords: peer assisted learning (PAL), PBL, tutor
INTRODUCTIONS

Peer tutoring is a program to help students who require additional assistance in academic subjects. Students are tutored by upper year students who have successfully completed the course. Peer tutoring is students helping students. Peer tutoring offers assistance for students having difficulties in a specific course. Problem Based Learning (PBL) is one of the key teaching and learning methodologies in Patan Academy of Health Sciences (PAHS). Peer tutoring can enhance the in-depth learning along with PBL. International interest in peer-teaching and peer-assisted learning (PAL) during undergraduate medical programs has grown in recent years, reflected both in literature and in practice.

TARGET GROUP

PAHS is newly established academy with dedication to improve the health status of the people of Nepal by producing doctors who are willing and able to provide health care in rural Nepal. When we were in basic sciences, there were so many learning issues for PBL and our discussion mainly focused on clinical aspects. After finishing the complete course of basic sciences we felt we need some guidance for junior students. Though teachers were present for all the time but hesitance and feeling of being inferior in class, many of us cannot ask questions and discussed with teacher in class. There used to be so many issues which remained unanswered. As we were the first batch, we did not have our seniors for the guidance, so we thought we will not let this happen to our juniors and started the peer-teaching and peer-assisted learning (PAL) in our medical school.

Peer tutoring and PAL is useful for all level of students. We do have some form of peer tutoring like learning in groups or PBL itself, but they were not fruitful for the needy students. In many of the medical schools, there are scenarios like students who have good relation with senior students get benefited during exam preparation time. So our peer tutoring can reach up to the all juniors who are interested. We are especially focusing on students who are not able to complete exit exam like basic science comprehensive examination and clinical science comprehensive examination. Our targeted students are students who have just started their basic sciences and one to one peer tutoring session for students who have not completed their exit exam. We are also planning to do examination skills for the third year students where they can learn and practice adequate practical skills.

METHODS

We started these tutoring sessions by discussing with the third and fourth batch students. They also showed us the same enthusiasm towards our program. List of the tutors were prepared one week prior to the actual peer tutoring sessions, usually from final year medical students and fourth year medical students. We select the different topics after discussing with the 1st year medical students one week prior, so that both tutor and learner have sufficient time to prepare about the topics. We select more than one tutor for a same topic but only one will be responsible for running the session was main tutor for that topic and others helped.

During peer tutoring session, students are divided into small groups of 10 members and session was run by 1 tutor. Other silent tutors assisted the main tutor if there was confusion. Students asked questions in between as we was primarily discussion session. Normally, a session was for 30-45 minutes and in a day maximum four sessions. We have completed six sessions till now and the number of participants are increasing with each session.

PLAN

Monitoring the effectiveness and productivity of tutoring sessions is a necessity. We can sustain it by involving a large number of students as tutor and regular supervision and monitoring from the faculties. We are taking regular written feedback from student to improve it. It would be more beneficial for the tutor if there were tutor training session by the academy, so that the creativity of tutor can be also improved. This can be accomplished by quizzing students on the topic they have covered or by conducting short MCQs by tutor. These sessions will help for the participants to monitor their progress by themselves and examination team can follow up the participants and assess their improvement and if some students are having constantly low grades then, they should be encouraged to attend tutoring session. Monitoring can be continued by having students monitor themselves, for example, by having the tutor keep track of correct and incorrect answers by making marks on a card. The results from each monitoring card from a tutoring session can then be used to fill in a progress chart which, over time, will be an indicator of progress.
CONCLUSIONS

Here is an old saying: “To teach is to learn twice.” Peer assisted learning will help us all to develop the competence and knowledge to both senior and juniors by learning together. These sessions will also increase the respect, love and friendly environment among the inter batch students which will help to decrease the conflict and ego. These sessions will also be helpful to increase the social skills like sense of teamwork, brotherhood and communication skills. It would be an example for other medical school.

References

Impact of Educational Intervention on Knowledge and Practice of Universal Precautions among Nurses

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ABSTRACT

Introductions: The purpose of this study was to find out the effectiveness of educational intervention in improving knowledge and practice of universal precautions among nurses.

Methods: This was a cross sectional observational study conducted at Patan Hospital in August 2008. Fifty nurses with minimum one year of experience were included. Twelve, out of 50 samples were selected by drawing lot for the study of practice of universal precautions. A semi-structured questionnaire was used to measure the knowledge and practice of universal precautions.

Results: The findings revealed that there was significant difference in the pre and post-intervention test mean knowledge. The grand mean score of knowledge and practice of universal precautions as a whole were 31.86 and 44.55 with standard deviations of 10.46 and 3.90; and 68.61 and 87.70 with standard deviations of 3.70 and 2.55 in the pre and post intervention tests respectively.

Conclusions: Educational intervention had significant role in increasing knowledge and practice of universal precautions among nurses.

Keywords: blood-borne infections, body fluids, knowledge and practice, needle stick injury, universal precautions

Plain Language Summary

The effectiveness of educational intervention in improving knowledge and practice of universal precautions among nurses was studied. The face to face educational intervention had significant role in increasing the knowledge and practice of universal precautions.
INTRODUCTIONS

Health care providers nurses, doctors, laboratory technicians are at risk of acquiring blood-borne infections through occupational exposure to sharp and needle-stick injuries. Young nurses with less professional experience are more prone to such injuries. Nurses less than 24 years of age had 92.2% risk of needle-stick injuries, 13 times higher than 40 years and above.1

The Center for Disease Control and Prevention (CDC) of USA introduced the concept of universal precautions (UP) as guidelines for protecting healthcare workers from becoming infected with blood borne infection.2

The number of sharps and needle-stick injuries per person among healthcare workers continues to be a challenge globally.3

The purpose of this study was to find out the effectiveness of educational intervention in improving nurses’ knowledge and practice of UP.

METHODS

This was a cross sectional observational study conducted in Patan Hospital, Patan Academy of Health Sciences, Nepal, in August 2008. The population of this study consisted of nurses working in medical, surgical, orthopedic, maternity, gynecology, intensive care unit and neonatal nursery of Patan Hospital. Non-probability convenience sampling technique was used. A total of 50 nurses were included to test the knowledge of UP before and after educational intervention. The nurses with minimum of one year of experience, with Proficiency Certificate Level education in nursing, willing to participate in the study were included. An educational intervention package was developed which included definition, purpose, components of UP, sources of infection, and factors contributing to enforcement of UP. A semi-structured questionnaire consisting of questions related to demographic characteristics and knowledge regarding UP was developed. The content validity was established by developing the instruments on the basis of literature review in consultation with research committee chairperson, research guide and subject expert. The reliability of the instruments was established by pre-testing it on five (10%) nurses working in Tribhuvan University Teaching Hospital.

Out of 50 nurses, 12 were selected by drawing lot to observe the practice of UP which included hand washing technique, use of gloves, and proper disposal of needles after use. The rating scale (1 to 3 score) was used to determine the level of practice of UP. The stepwise practice of hand washing technique included removing watch and jewelry, soap application, rinsing hands from fingertips upwards and drying with clean towel.

The data were collected by self-administered questionnaire before the educational intervention followed by educational intervention on the same day. Two weeks later, the post-intervention test was conducted by administering the same tool to the same participants.

Permission for study was obtained from the hospital authority. Verbal informed consent was obtained from participants. They were ensured about anonymity, confidentiality and refusal to participate or withdraw from the study if they wished so. The schedule for data collection and educational intervention were planned according to suitable time given by the hospital administration, and was done in three sessions.

Completeness and consistency of questionnaire was checked. SPSS version 11.5 was used for analysis. Frequency, percentage, mean, and standard deviation were calculated. Chi-square, ‘z’-test and ‘t’-test were used for pre and post-intervention analysis of knowledge and practices of UP. ‘p’-value <0.05 was considered significant.

RESULTS

All 50 nurses were female with mean age of 25.7 years (range 21 to 42) and 31 were below 25 years of age. In terms of years of working experiences, 40 had 1 to 5 years of experience (26 had 1 to 3 years), seven had 5-10 years and three above 10 years. Only 15 respondents had orientation class on UP and none had received in-service training.

The knowledge score regarding body fluids: semen, vaginal and amniotic, cerebrospinal and breast milk as a source of infection were 42, 18, 12 in the pre-intervention test; and 46, 43, 41 in the post-intervention test respectively. The difference between pre and post-intervention knowledge about cerebrospinal fluid and breast milk were significant (p=0.000); whereas semen, vaginal and amniotic fluids were not significant (p=0.218).

The knowledge score regarding decontamination, high-level disinfection (HDL) and sterilization revealed that the correct responses ranged from seven to 25 in the pre-intervention test and 46, 43, 41 in the post-intervention test respectively. The difference between pre and post-intervention test knowledge about cerebrospinal fluid and breast milk were significant (p=0.000); whereas semen, vaginal and amniotic fluids were not significant (p=0.218).

The knowledge regarding decontamination, high-level disinfection (HDL) and sterilization revealed that the correct responses ranged from seven to 25 in the pre-intervention test and 26 to 44 in the post-intervention test. The difference between the pre and post-intervention level of knowledge score were statistically significant with score of 14.22% and 34.77%.
Table 1. Pre and post-intervention knowledge about UP among nurses (n=50)

<table>
<thead>
<tr>
<th>Components</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>X2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Hand washing:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before &amp; after performing any procedure</td>
<td>48</td>
<td>96.00</td>
<td>50</td>
<td>100.00</td>
</tr>
<tr>
<td>After removing gloves</td>
<td>30</td>
<td>60.00</td>
<td>42</td>
<td>84.00</td>
</tr>
<tr>
<td>After handling contaminated items</td>
<td>38</td>
<td>76.00</td>
<td>48</td>
<td>96.00</td>
</tr>
<tr>
<td>Splashes of Blood/body fluids:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash face with soap &amp; water immediately</td>
<td>49</td>
<td>98.00</td>
<td>50</td>
<td>100.00</td>
</tr>
<tr>
<td>Needle-stick injury:</td>
<td>38</td>
<td>76.00</td>
<td>48</td>
<td>96.00</td>
</tr>
<tr>
<td>Mean Score</td>
<td>40.66</td>
<td>7.33</td>
<td>47.66</td>
<td>3.33</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UP= universal precaution, *Negative response, **Z test

There was least difference in the knowledge score where the respondents had previous knowledge like management of blood and body fluids exposures, disposal of wastes. The difference between pre and post-intervention level were statistically significant for those questions where the respondents did not have previous knowledge.

The individual knowledge score in pre-intervention among 50 respondents was of low level (<50.0%) in nine and moderate (50.0% to 75.0%) in 41 and post intervention it was moderate level (50.0% to 75.0%) in 18 and high (>75.0%) in 33.

Table 2. Pre and post-intervention knowledge of UP among nurses (n=50)

<table>
<thead>
<tr>
<th>Knowledge Items</th>
<th>Mean Score (%) ± SD</th>
<th>X2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Information</td>
<td>35.22 ± 17.66</td>
<td>3.44</td>
<td>0.00</td>
</tr>
<tr>
<td>Sources of infection</td>
<td>24.00 ± 15.88</td>
<td>2.55</td>
<td>0.00</td>
</tr>
<tr>
<td>Utilization of PPE in UP</td>
<td>45.22 ± 3.66</td>
<td>1.22</td>
<td>0.164</td>
</tr>
<tr>
<td>Safe work practices in UP</td>
<td>40.66 ± 7.33</td>
<td>3.33</td>
<td>0.003</td>
</tr>
<tr>
<td>Decontamination, High-Level-Disinfection and sterilization</td>
<td>14.22 ± 7.77</td>
<td>9.00</td>
<td>0.000</td>
</tr>
<tr>
<td>Grand Mean Score (MS)</td>
<td>31.86 ± 10.46</td>
<td>44.55</td>
<td>0.033**</td>
</tr>
<tr>
<td>Grand Standard Deviation (SD)</td>
<td></td>
<td>3.90</td>
<td></td>
</tr>
</tbody>
</table>

PPE= Personal Protective Equipment

There was significant difference in the pre and post-intervention mean score of practice of universal precautions. The individual practice score revealed that 12 had moderate level (60.0% to 80.0%) of practice in the pre-test and 12 had high level (>80.0%) of practice in the post-test respectively.

After educational intervention the practice of UP improved for handling of needles, washing hands and use of gloves, Table 3 and 4.

The stepwise practice of hand washing technique score ranged from 52.88 (rinsing hands from finger tips towards) to 83.33 (drying hands with clean, dry towel) in pre-intervention practice and 72.22 (removing watch and jewelry) to 94.44 (soap application; drying hands) in post-intervention practice. The difference were significant with p=0.000.

The score on practice of use of gloves ranged from 44.44 to 100.00 in the pre-intervention and 80.55 to 100.00 in the post-intervention. The difference were significant with p=0.000.

Table 3. Pre and post-intervention practice of UP- handling of needles after use among nurses (n=12)

<table>
<thead>
<tr>
<th>Procedural steps</th>
<th>Mean Score (%) ± SD</th>
<th>P value for ‘t’ test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does not recap, bend, break or manipulate needles after use.</td>
<td>100.00 ± 0.00</td>
<td>0.000</td>
</tr>
<tr>
<td>2. Carries syringe &amp; needle in a small tray.</td>
<td>100.00 ± 0.00</td>
<td>0.000</td>
</tr>
<tr>
<td>3. Disposes in puncture resistant container.</td>
<td>63.80 ± 0.77</td>
<td>0.000</td>
</tr>
<tr>
<td>4. If reusing syringes, soaks in 0.5% chlorine solution for 10 minutes.</td>
<td>47.22 ± 0.50</td>
<td>0.66</td>
</tr>
<tr>
<td>5. Rinses the syringe in clean water.</td>
<td>41.66 ± 0.44</td>
<td>0.057</td>
</tr>
<tr>
<td>Mean Score</td>
<td>70.53 ± 0.34</td>
<td>0.25</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Pre and post-intervention practice of UP among nurses (n=12)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Mean Score (%) ± SD</th>
<th>P value for ‘t’ test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Washing</td>
<td>62.06 ± 6.33</td>
<td>5.31</td>
</tr>
<tr>
<td>Use of Gloves</td>
<td>73.26 ± 4.45</td>
<td>2.09</td>
</tr>
<tr>
<td>Handling of Needle</td>
<td>70.53 ± 0.34</td>
<td>0.25</td>
</tr>
<tr>
<td>Grand Mean</td>
<td>68.61 ± 3.70</td>
<td>2.55</td>
</tr>
<tr>
<td>Grand SD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSIONS

Most of the nurses were in early stage of career with less than five years experience, 40 within 1 to 5 years (26 within 1 to 3 years). According to Mustafa young nurses with less professional experience, working in surgical and intensive care unit were accepted as risk group and targeted for training program.4
We found that there was least difference in the pre and post-intervention scores in terms of knowledge about the utilization of gloves, mask, goggles and gown but in practice did not translate in to compliance to use gloves when starting intravenous (IV) drip and drawing blood. The reason for not using the gloves was practical difficulty on palpating the veins and securing of cannula with tape which tends to stick to the gloves and interfere with dexterity.

Even though the hospital had written policy for post-exposure prophylaxis, and respondents had good knowledge about the situations of splashes of blood/body fluids and needle-stick injuries but lacked to report such injuries in time. This probably requires more awareness training and reporting. HLD was not practiced, so that may be the reason that there were significant changes in the knowledge in the post-intervention as the respondents did not have a good knowledge before the educational intervention.

There was lack of compliance to remove watches, bangles, finger rings which interfered with the hand washing technique. Trick also found out that the adherence to hand washing and proper washing technique by healthcare workers were uncommon. Creedon stated that the hospital acquired infections are serious problem, pathogens are readily transmitted to health workers hands and hand washing substantially reduces transmission.5,6

The good practice of handling needles after use might be due to good knowledge and hospital providing resources like puncture resistant container at convenient places like in the working area and dirty utility room, availability of IV trolley, and trays to carry syringe.

This study shows face to face educational intervention had significant role in increasing the knowledge and practice of universal precaution like other studies7-10 and should be included in comprehensive in-service educational program for nurses and possibly other healthcare workers.

The study had small sample size from a single hospital and convenience sampling which may affect adequate representation of the knowledge of nurses regarding practice of universal precaution.

CONCLUSIONS

Educational intervention had significant role in increasing the level of knowledge and practice of universal precaution among nurses.

ACKNOWLEDGEMENTS

I am grateful to the chairperson and members of research committee of Maharajgunj Nursing Campus for their help in development of study protocol. I appreciate the leadership of Patan Hospital for allowing this study and nurses for their kind co-operation.

REFERENCES

Nursing Posting for Medical Students

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¹Professor, ²Lecturer, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT

Nursing perspective is different from doctors. It is a known fact that doctors and nurses must work together for the better patient care. It is very important for doctors to know how nursing services are provided. Moreover a good communication and team work is an essence of present medical service. So, this attitude should be embedded in the medical education to decrease professional distance and increase mutual respect in future. PAHS has provided this opportunity as a nursing posting with a vision of holistic teaching of medical students and shaping a positive attitude towards all health care providers.

Keywords: medical education, medical student, nursing

INTRODUCTIONS

This is interesting to have medical school curriculum require doctors to work as nurses during the training. School of medicine, PAHS has included a week long ‘nursing posting’ for medical students. The first week of medical school starts with all the medical students work alongside nurses, in shift duty, providing ‘actual nursing care’ for the patients as per the order for individual patients.

VISION

This gives the future doctors a first hand, practical exposure of nursing care for the patients, to ‘feel’ from nurses perspective how to provide for the patients, their expectations while admitted in hospital beds, and develop ‘respect’ for the work provided by nurses in overall patient care, like monitoring vitals, making beds, maintaining IV lines, oxygen delivery, nebulization, food and nutrition, family support and many more.

This program has given opportunity for both nurses and medical students to appreciate each other better, to minimize the professional distance there may be between doctors and nurses. Contrary to the culture of addressing by ‘Doctor this or Doctor that’, feel comfortable by calling the medical students by their first name. This endeavor has given opportunity for rapport building and professional bonding of young medical students with nurses early in start of their medical school. Nurses feel that they have chance to contribute in overall holistic teaching of medical students and shaping their attitude towards health care providers by developing mutual respect in team work for better service delivery to the patients and their family.
PRESENT STATUS

This program has been gained recognition from nurses and medical students, faculties and stakeholders. This ‘nursing posting’ for medical students has been now increased to two weeks from the earlier trial and skepticism of one week duration. Students are required to submit their ‘reflection’ in writing and analyzed for the further improvements of the curriculum. By the completion of this posting we conduct a “debriefing meeting” attended the students, nursing in-charge of different wards, faculties, dean and other executives.

STUDENT’S REFLECTION

The reflection from a student posted in Emergency department.

“In the first week of clinical year, we had nursing week posting. I was posted to Emergency room. I learnt so many things form nursing posting which is necessary in medical life. For the effective treatment of patient, combined care of doctors, nurses and other staffs is necessary. There should be good communication between all staffs. The doctors come in round and examine the patient and prescribe medicine but its the nurses who take care of patient most of the time. And there is gap of communication between doctors and nurses sometimes. So I learnt about importance of communication between doctors and nurses. I learnt about proper waste disposal technique (different colors of bucket for different types of waste product). Bed making, equipment and recording system is also necessary to learn because sometimes we have to do that work. So I am very happy to learn about all that systems. Due to this nursing posting, the relationship between nurses and medical student has become good which is very important for learning in further major rotations.”

Few of the important things that I should reflect are:

1. Attended handover work as the duty shifted to next group of nurses.
2. Participated on bedside nursing care (Assisting nurses to make bed and oral care, back care).
3. Central supply was not working of sterilization of the devices and sending them back to the ward, observed the reporting system of that.
4. Observe the coordination and functioning of endoscopy ward(counseling to patient, nursing care given to them, recording the patient information into computer, cross checking the report and patients name, assisting the doctor directly by doing sterilization of device, giving oral analgesic to patient, capturing photo of endoscopy, calling patients serially etc)
5. Got information about “Vaccine Preventable Disease Surveillance System” of Nepal which is also implemented at PH. It was senior nurse’s duty to record the admitted cases of infective diseased individuals’ esp. measles, pneumonia, meningitis, polio and tetanus and reporting it to the Government of Nepal every Monday or Tuesday by means of fax.
7. Observed the feeding done by nurses to the patient.
8. Observed and performed Ox meter to know the SPO2 and pulse of patient.
10. Observed the medication care provided by nurses to the patient. One of the interesting thing that I found was they used to put the oral tablets directly in a lead of bottle without directly touching the hand and put it into patient’s mouth. Nice way of preventing contamination.
11. NPO: Nil per oral.
12. Cardex: report card which includes patient’s diagnosis, medications, ways of medication, timing etc .
   • Got knowledge about Nursing that includes:
   • Bedside nursing care (bed making, back care, oral care)
   • Ambulation

NURSING REFLECTION

The experience shared by nursing staff while working with students.

“Working and teaching medical students is a great experience. This is a very noble idea of connecting students with nursing. This is though very important but is not looked into seriously in existing medical education. It is very important that students know how nursing functions in every department. This will help students to communicate and maintain a good rapport with the team. After all good medical care is a combined effort from everyone. I believe this is a great opportunity for ourselves as well to get updated. Once students start putting up their queries we have to take time from mechanical work and start reading. This will foster an academic environment of learning and teaching which can be done both ways.
This is also one area where we see, meet and connect with patients very closely. Apart from academic part that they will learn in this posting, they will also be able to see patients very closely into their hearts and soul. This will definitely improve the quality of health care services provided to the patient. If this continues, the day is not far when patient will always remember being taken care by students.

I believe that this is a part of the foundation in a medical study. Once a foundation is strong we can expect the future to be very strong. So, with this type of medical education, we are expecting a cooperative, well mannered, patient centered and skillful doctor out of PAHS medical students.”

CONCLUSIONS

This nursing posting of medical students in the beginning of medical school curriculum is important and rewarding to ‘build foundation’ for the future ‘team work’, minimize the ‘professional gap’ between doctors and nurses and also develop the ‘feelings’ from nurses perspective how important it is to ‘listen’ to the suffering of the patients and their family for holistic patient care.

ACKNOWLEDGEMENTS

We would like to acknowledge Prof. Dr. Kedar Baral, Prof. Dr. Shrijana Shrestha, Prof. Dr. Rajesh Gongal, Mrs. Narayani Rai for their support in materializing the vision of Nursing Week.
Students’ Perception and Preference of Problem Based Learning During Introductory Course of a Nepalese Medical School

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ABSTRACT

Introduction: Problem based learning is considered superior to the conventional didactic teaching for contextual learning, long term retention of knowledge, development of generic skill and attitudes. This study looked into the students’ perception and preference of problem based learning in a six-month introductory course in the beginning of undergraduate medical school program.

Methods: A 20-item questionnaire with four-point rating scale (1-strongly disagree, 2-Disagree, 3-Agree and 4-Strongly agree) was administered to collect first year medical students’ perception on problem based learning during first six month introductory course (June 2010 to November 2010) of first batch of medical students. The questionnaire included 13-items for perception and seven for preferences. It also had an open-ended comment section.

Results: Students showed positive reaction problem based learning irrespective of gender or educational background in providing contextual learning and retention of knowledge. Students agreed that it fostered generic skills (communication, group work, critical thinking, reasoning, reflectiveness and self-directed learning). Students wished for more such sessions in more subjects with short content assessment at the end of the sessions.

Conclusions: Problem based learning is fun, provides contextual learning and imparts long term retention of knowledge through students’ active participation in a small group. It also promotes generic skills and self-directed life-long learning.

Keywords: medical school, perception, problem based learning, students

Plain Language Summary

The study was conducted to see the effectiveness of problem based learning (PBL) in a six-month long ‘Introductory Course’ of undergraduate medical sciences program. The study found that PBL made topics interesting and created a fun-filled learning environment. It found PBL to be effective in fulfilling learning objectives and making the contents relevant. It also showed PBL to be effective in promoting a set of generic skills and attitudes. Thus, the curricular contents presented in context through PBL can impart meaningful knowledge and a set of generic skills that are important to develop of a habit of self-directed, life-long learning.
INTRODUCTIONS

School of Medicine, Patan Academy of Health Sciences (PAHS-SOM) has created graduate attributes encompassing cognitive and non-cognitive domains. To foster these attributes among its medical graduates, PAHS-SOM has adopted Problem Based Learning (PBL) and Community Based Learning and Education (CBLE).

PBL is major teaching-learning method for first two and half years of undergraduate medical school program, which includes six-month of introductory or foundation course followed by two years of basic sciences. PBL is a learner-centered method with distinct advantage over the conventional teacher-centered didactic method in promoting a long-term retention of information, providing contextual learning and development of generic skills and attitudes.

Since didactic lectures are main teaching-learning method in senior high school in Nepal, PBL is introduced in Introductory Course to foster the cognitive and non-cognitive skills among incoming students of PAHS-SOM. This study was conducted to measure students’ “reaction” on PBL they underwent during introductory course.

METHODS

In six months introductory course, a PBL case was conducted each week with three tutorial sessions of two hours duration conducted on alternate day (starting on Sunday) and facilitated by a trained tutor. Self-study period of at least one and half times of the total PBL hours was embedded in between the tutorial session. The PBL case was concluded at the end of each week (on Friday) with an hour long large group wrap-up session including all seven PBL groups (8 to 9 students in one group) in the presence of concerned discipline experts and tutors.

Students underwent PBL tutorial orientation program where a simulated tutorial session was demonstrated prior to the course. A total of 13 PBL cases, three from community health sciences (CHS), two each from Physics, Chemistry, Biology, Medical Informatics and Introduction to Clinical Medicine (ICM, early clinical exposure) were implemented.

A questionnaire was designed to measure the students’ reaction, corresponding to Kirkpatrick’s learning evaluation model. The questionnaire was validated through series of discussions in PBL committee and experts in PBL within and outside of PAHS-SOM. It consisted of 15 items of which 13 measured students’ perception on PBL process and two items measured their preference about the PBL. The fifteenth item consisted of six sub-items measuring students’ preference for specific disciplines. This anonymous questionnaire utilized a four-point forced Likert scale (1-strongly disagree, 2-Disagree, 3-Agree and 4-Strongly agree). The questionnaire also consisted of an open-ended section to comment on the PBL process and contents.

Data entry was done in Excel spread sheet. Cronbach’s alpha, median and inter-quartile range (IQR) were calculated in SPSS 15 for Windows. P-value less than or equal to 0.05 was taken as statistically significant result for comparing median. Consensus Index was used to interpret the Likert scale responses. Students’ comments were analyzed using pile sorting method in MS Excel 2007. Ethical approval (Ref: 2011.105.sg) was obtained from the Institutional Review Committee (IRC) of PAHS.

RESULTS

Out of 60 students, fifty seven returned the filled questionnaire. There were 40 (70.17%) male and 17 (29.83%) female students. Fifty two students were from science background with two years (class 11 and 12) of natural sciences (physics, chemistry, biology) after high school (class 10). Five students were from health sciences background with paramedical education training for two and half to three years after high school. The median age of the respondents was 20 years with Interquartile Range (IQR) of one year.

The tool was highly reliable with internal construct reliability more than 90% (Cronbach’s alpha = 0.903). Perception sub-scale was highly reliable (Cronbach’s alpha = 0.907) and preference sub-scale was acceptable for (Cronbach’s alpha = 0.708).

The median perception scores for female students (in comparison to male) and health sciences graduates (in comparison to high school) was high. The difference in perception score was statistically non-significant on Mann Whitney test (p-value = 0.427 and 0.529). The preference scores among gender and education stream were not different, Mann Whitney test (p-value = 0.473 for gender and p-value = 0.615 for educational stream).
Table 1. Perception and preference scores for PBL by gender and educational stream of medical students in first six months of introductory course

<table>
<thead>
<tr>
<th>Item</th>
<th>Gender</th>
<th>Education stream</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (n=40)</td>
<td>Female (n=17)</td>
<td>High School (n=52)</td>
</tr>
<tr>
<td>Median Perception score</td>
<td>41 (6.00)</td>
<td>43 (4.5)</td>
<td>41 (6.00)</td>
</tr>
<tr>
<td>Median Preference score</td>
<td>21 (4.00)</td>
<td>21 (4.00)</td>
<td>21 (5.00)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses show inter-quartile range (IQR), PBL (problem based learning)

Table 2. Consensus among first year medical students about perception and preference of PBL during six months introductory course

<table>
<thead>
<tr>
<th>Item Numbers</th>
<th>Items</th>
<th>Rating</th>
<th>SD</th>
<th>DA</th>
<th>A</th>
<th>SA</th>
<th>Qn(i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PBL is more effective in fulfilling the learning objectives of the topic</td>
<td>0 (0.0)</td>
<td>16 (28.1)</td>
<td>34 (59.6)</td>
<td>7 (12.3)</td>
<td>62.1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>PBL imparts better content knowledge of the topic</td>
<td>0 (0.0)</td>
<td>11 (19.3)</td>
<td>34 (59.6)</td>
<td>12 (21.1)</td>
<td>68.6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>PBL encourages me to learn in context</td>
<td>0 (0.0)</td>
<td>5 (8.8)</td>
<td>34 (59.6)</td>
<td>18 (31.6)</td>
<td>76.2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>PBL promotes the retention of knowledge</td>
<td>1 (1.8)</td>
<td>3 (5.3)</td>
<td>39 (68.4)</td>
<td>13 (22.8)</td>
<td>81.1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PBL promotes my participation in the learning process</td>
<td>1 (1.8)</td>
<td>2 (3.5)</td>
<td>37 (64.9)</td>
<td>17 (29.8)</td>
<td>79.3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PBL promotes my critical thinking skill of the topic</td>
<td>1 (1.8)</td>
<td>3 (5.3)</td>
<td>33 (57.9)</td>
<td>20 (35.1)</td>
<td>75.8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>PBL promotes my reasoning skill of the topic</td>
<td>1 (1.8)</td>
<td>4 (7.0)</td>
<td>36 (63.2)</td>
<td>16 (28.1)</td>
<td>77.4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>PBL promotes my self-directed learning on the topic</td>
<td>1 (1.8)</td>
<td>0 (0.0)</td>
<td>25 (43.9)</td>
<td>31 (54.4)</td>
<td>78.4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>PBL promotes my group skills</td>
<td>1 (1.8)</td>
<td>4 (7.0)</td>
<td>26 (45.6)</td>
<td>26 (45.6)</td>
<td>71.1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>PBL promotes my communication skill</td>
<td>1 (1.8)</td>
<td>0 (0.0)</td>
<td>28 (49.1)</td>
<td>28 (49.1)</td>
<td>78.5V</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>PBL helps me to identify my strength and weaknesses</td>
<td>1 (1.8)</td>
<td>3 (5.3)</td>
<td>35 (61.4)</td>
<td>18 (31.6)</td>
<td>77.2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>PBL makes the topic more interesting and fun learning</td>
<td>1 (1.8)</td>
<td>8 (14.0)</td>
<td>33 (57.9)</td>
<td>15 (26.3)</td>
<td>70.8</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>PBL promotes to explore different resource materials</td>
<td>1 (1.8)</td>
<td>4 (7.0)</td>
<td>29 (50.9)</td>
<td>25 (45.9)</td>
<td>75.1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I prefer to have a short content assessment at the end of each PBL case</td>
<td>1 (1.8)</td>
<td>7 (12.3)</td>
<td>21 (36.8)</td>
<td>28 (49.1)</td>
<td>64.7</td>
<td></td>
</tr>
<tr>
<td>15.1</td>
<td>I prefer more PBL sessions on Physics</td>
<td>8 (14.0)</td>
<td>14 (24.6)</td>
<td>22 (38.6)</td>
<td>11 (19.3)</td>
<td>36.3</td>
<td></td>
</tr>
<tr>
<td>15.2</td>
<td>I prefer more PBL sessions on Chemistry</td>
<td>2 (3.5)</td>
<td>11 (19.3)</td>
<td>37 (64.9)</td>
<td>5 (8.8)</td>
<td>63.7</td>
<td></td>
</tr>
<tr>
<td>15.3</td>
<td>I prefer more PBL sessions on Biology</td>
<td>2 (3.5)</td>
<td>1 (1.8)</td>
<td>35 (61.4)</td>
<td>18 (31.6)</td>
<td>77.9</td>
<td></td>
</tr>
<tr>
<td>15.4</td>
<td>I prefer more PBL sessions on Medical Informatics</td>
<td>7 (12.3)</td>
<td>13 (22.8)</td>
<td>22 (38.6)</td>
<td>12 (21.1)</td>
<td>39.1</td>
<td></td>
</tr>
<tr>
<td>15.5</td>
<td>I prefer more PBL sessions on Introduction to Clinical Medicine</td>
<td>1 (1.8)</td>
<td>3 (5.3)</td>
<td>32 (56.1)</td>
<td>19 (33.3)</td>
<td>75.8</td>
<td></td>
</tr>
<tr>
<td>15.6</td>
<td>I prefer more PBL sessions on Community Health Sciences</td>
<td>1 (1.8)</td>
<td>8 (14.0)</td>
<td>23 (40.4)</td>
<td>23 (40.4)</td>
<td>65.0</td>
<td></td>
</tr>
</tbody>
</table>

Note: Figures in the parentheses are percentage, SD – Strongly Disagree, A – Agree, D – Disagree, SA – Strongly Agree

Students agreed that PBL promoted retention of knowledge by participation in the learning process, communication skills, self-directed learning, reasoning skills, identifying strengths and weaknesses, learning in context, critical thinking skills and exploration of different resource materials based on Consensus Index, groups skills, made topic more interesting and fun learning, imparted better content knowledge and was more effective in fulfilling learning objectives.

More students preferred a short content assessment at the end of PBL case and wanted more cases in Biology, ICM, Chemistry and CHS. Less students preferred to have more cases in Medical Informatics and Physics.
PBL is a student centered teaching-learning methodology where students first encounter a problem followed by a systematic, learner-centered inquiry and reflection process. Problem imposed to the student will itself serve as stimulus to self-directed learning independently or in a group enabling the students to understand the relevant scientific knowledge and principle in context while acquiring a set of non-cognitive skills at the same time.10,11 Many studies have compared the outcomes of PBL and conventional teaching method showing students’ strong preference to PBL. Moreover, students have shown more positive attitudes toward PBL curriculum and found learning more enjoyable with strong awareness of social issues in medicine.2,12

As assessment drives learning, most of the students preferred to have a short content assessment at the end of the PBL session to evaluate their learning and find the gap. Students had also expressed in open comment section their apprehension regarding the knowledge gap and if the appropriate depth of the knowledge had been acquired. However, there are evidences to support that PBL does not lead to any significant knowledge deficiency.13,14 As PBL is found to be very effective in promoting long term retention of knowledge, the assessment at the end of the PBL session which only promotes the short term recall of knowledge contradicts with the evidence of having PBL as main teaching method to foster performance improvement and the long term retention of knowledge.13

The students performed well in the summative examination of this six months of introductory courses involving external examiners: 58 out of 60 students passed the examination. The examination consisted of Structured Integrated Short Answer Questions (SISDAQ) (or Problem Based Questions) and vignette based Multiple Choice Questions assessing higher order cognitive level along with assessment of skill through Objective Structured Practical/Clinical Examinations (OSPE/OSCE). This is something PBL approach tended to favor when it comes to the assessment of elaboration and application of knowledge and skills.13 The summative exam result also indicates that they had done expected learning through PBL, which is on contrary to their concern about knowledge gap in PBL.

In this study, majority of the students preferred PBL cases for contents delivery in most of the subjects of Introductory Course namely Biology, Chemistry, Introduction to Clinical Medicine and Community Health Sciences. The reasons were relevance of these subjects for the subsequent basic and clinical sciences course. It also suggests students’ strong affinity to this type of teaching method. Similar findings have also been reported from KUSMS and BPKIHS.8,9 However, students seemed to

### Table 3. Concerns expressed by first year medical students regarding PBL during six months introductory course

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Concerns</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Having no knowledge assessment at the end of each PBL session</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Having no homogeneity and accuracy of acquired knowledge among peers</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Case objectives being not covered</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Going out of track during discussion</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Time-consuming learning process</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Confusion regarding depth of knowledge required</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Lack of resources for self-directed learning</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Language as English is mandatory for PBL sessions</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Self-learning being not-effective</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Evaluation of students’ performance in PBL by tutor being biased</td>
<td>1</td>
</tr>
</tbody>
</table>

**DISCUSSIONS**

In this study, the students from both educational streams i.e. general sciences and health sciences highly rated the process and outcomes of PBL as effective process despite being an entirely new learning method. The PBL made the learning interesting and fun to fulfill the learning objectives with relevance and understand better for retention of the knowledge. Majority of students found PBL very effective for development of generic skills and attitudes. Students also expressed their greater interest in having most of their contents to be delivered through PBL.

Similar findings were reported among students pursuing 3-years certificate level allied health science (laboratory technology, physiotherapy and general medicine) courses after their high school in Kathmandu University School of Medical Sciences (KUSMS), Nepal.7 Another study from KUSMS, Nepal conducted among the second and third year undergraduate medical students reported students’ overall experience and attitude towards PBL during basic sciences as positive and further showed their willingness to have PBL during clinical years.8 A study from B.P. Koirala Institute of Health Sciences (BPKIHS), Nepal having partial PBL curriculum during basic sciences also reported greater interest and enthusiasm towards PBL by the students.9
have less agreement in having more cases on Physics and Medical Informatics (MI). The reasons cited were the content difficulty (for physics, “should be taught through lectures”), no relevance to the subsequent medical course (Physics and MI), having no prior knowledge (MI) and delivery mismatch (“MI is better taught through practical sessions”).

This study only shows the reaction of students towards the PBL process and their performance in the summative exam of Introductory Course. However, their performance in subsequent basic sciences phase of the curriculum in terms of cognitive as well as non-cognitive skills through PBL remains to be evaluated.

It is also important to note that Nepal Medical Council, the accreditation body, in its guideline has advocated the incorporation of PBL method as innovation in undergraduate medical education program. Majority (10 out of 17) of the medical schools in Nepal now use PBL in one form or the other. The present study and other studies have shown the effectiveness of PBL method and students’ positive attitudes towards the process and outcomes of PBL, thereby negating the concern and scepticism, if any, regarding the appropriateness of this method in our context too.

CONCLUSIONS

The students’ perception and preference of PBL in a six-month introductory course in the beginning of undergraduate medical school program was contextual in fun filled environment promoting retention of knowledge and helpful in development of generic skills such as communication skill, critical thinking and reasoning, group skills, reflectiveness along with self-directed learning and life-long learning habits.

To minimize the concerns expressed by students the curriculum committee should monitor the implementation of PBL process by designing PBL cases with well explained tutor guide to fulfil the case objectives and to keep the discussion on track, conduct PBL case orientation session and tutorial skills training for tutors, provide feedback to students and tutors on their performance.

The evaluation on behavioural change and life-long performance of students is required to establish the long-term effect of PBL in the local context.

ACKNOWLEDGEMENTS

PBL Committee, School of Medicine, Patan Academy of Health Sciences (PAHS-SOM) for their role in validation of questionnaire for this study.

REFERENCES
