"EARLY POSTOPERATIVE COMPLICATIONS OF MESH REPAIR OF INGUINAL HERNIA BY LICHTENSTEIN TENSION-FREE REPAIR"

BAKHT SARWAR¹, MOHAMMAD AMIN¹

1. District Headquarters Hospital, Timergara, District Lower Dir, Khyber Pakhtunkhwa

ABSTRACT

BACKGROUND: To find out the early postoperative complications of mesh repair of inguinal hernia by Lichtenstein tension free repair.

METHODOLOGY: This descriptive study was done in Surgical Unit of District Headquarters Hospital, Timergara, Dir Lower, for 1 year, from 01-01-2013 to 31-12-2013. A total of 100 cases of inguinal hernia, male, age 20 years and above, all inguinal hernias (direct and indirect) and recurrent hernias were included in the study in which mesh repair was performed. Females and complicated hernias (strangulated/obstructed) cases were excluded from the study. Included cases were followed up in the ward and at 2 weeks and 1st month postoperatively for any complications.

RESULTS: Majority 23% cases were in the age range of 51-60 years. The right sided hernia found in 62% cases, in 55% cases indirect inguinal hernia and in majority 97% cases primary inguinal hernia was recorded. Postoperatively at 2 weeks follow up wound hematoma was found in 10% cases, seroma in 09%, wound infection in 02%, pain in 12%, urinary retention in 06%, and scrotal swelling in 04% cases. Postoperatively at 1st month follow up wound hematoma was found in 06% cases, seroma in 04%, wound infection in 01%, pain in 07%, urinary retention in 03%, and scrotal swelling in 01% cases.

CONCLUSIONS: In majority of cases right sided, indirect, primary inguinal hernia has been recorded. Older age males and patients with poor and unhygienic conditions were more affected with this disease.

KEY WORDS: Inguinal hernia-primary; recurrent, mesh hernioplasty, postoperative pain, wound infection, hematoma, seroma.

INTRODUCTION:

A hernia is a protrusion of a viscus or part of a viscus through an opening in the walls of its containing cavity.¹

Hernia constitutes 10-15% of all surgical procedures, 80% being inguinal and 92% are in men.² Inguinal hernias are common throughout the world. These account for 75% for all forms of hernias and more commons in males than females in ratio of 20:1.³

It is more likely to occur in men than in women because the spermatic cord passes through the abdominal wall in the inguinal region leaving a site of natural weakness prone to hernia formation.⁴ Although the disease is associated with considerable morbidity, mortality is rare,

except in remote areas where delay in treatment can lead to strangulation and death. Several factors account for frequency of this disease that are upright position, occupational factors and conditions such as persistent cough or constipation, that increases intra abdominal pressure.⁵

Traditionally the inguinal hernia repair is performed through an incision in the groin. Different kinds of operations are performed as repair by using the patient's own tissue, or use of prosthetic mesh to reinforce the abdominal wall.⁶ Different types of repairs are Darning, Shouldice, Bassini and Lichtenstein tension free repair. Lichtenstein tension free repair of inguinal hernia is a simple, easier to learn with no significant early and late morbidity.⁷ The use

of polypropylene mesh in Lichtenstein repair is standard and safe but as every surgery has complications, it has some early and late complications.⁸ Mesh associated complications like postoperative wound infection, hematoma,⁹ seroma,¹⁰ urinary retention, testicular complications/hydrocele, postoperative pain¹¹ and general complications like urinary tract infection, chest infections, deep vein thrombosis.¹² The mesh repair has comparable results in return to work, return to daily activities, complications, postoperative pain and quality of life.¹³

Various repair procedures fall into two categories. Fascial repair, tension free prosthetic repair and open preperitoneal mesh repair for recurrent inguinal hernia is a safe procedure.¹¹

In recent years, use of prosthetic materials for inguinal hernia repairs has increased dramatically. Tension free repairs have gained popularity not only for recurrent or complicated hernia but for primary hernia repair as well.¹⁴ Inguinal hernia repair with mesh is one of the most common procedures in general surgery and antibiotic consumption for preventive purposes is becoming a serious problem due to the risk of contribution to development of bacterial resistance and the significant increase in health-care costs.¹⁵

Polypropylene mesh is the most widely used material in inguinal hernia repair.¹⁶ It is the preferred prosthetic material for the tension-free hernioplasties because it handle well and become quickly incorporated, having reduced the recurrence rate below 1%.¹⁷

Tension-free repair (with prosthetic mesh) involves the use of synthetic prosthetic materials for rebuilding the posterior inguinal wall. Tension-free repair reduces the recurrence rate, improves postoperative recovery, and lowers cost, it has become the gold standard procedure for repairing inguinal hernias.¹⁸

Men presenting with inguinal hernia often have minimal symptoms, if any. Although elective

surgery is often recommended to prevent complications, it carries the risk of hernia recurrence, pain and discomfort as well as the risks associated with anesthesia and surgery, such as hematoma and infection.¹⁹

It is a fact that there is high rate of postoperative complications in our setup so it was the rationale of the study to know about these early complications in mesh repair for inguinal hernia so that they can be treated as early as possible to comfort the patients and avoid these complications in the future cases.

METHODOLOGY

This study was performed at surgical ward of District Headquarters Hospital, Timergara, Dir Lower, for one year, from 01-01-2013 to 31-12-2013. A total of 100 cases of inguinal hernia, male, age 20 years and above, all inguinal hernias (direct and indirect) and recurrent hernias were included in the study in whom mesh repair was performed. Females and complicated hernias (strangulated/obstructed) cases were excluded from the study.

All patients with inguinal hernia presenting to out-patient department, were admitted in the surgical ward of District Headquarters Hospital, Timergara, Dir Lower. All patients with inguinal hernias keeping in mind the inclusion and exclusion criteria, after taking informed consent from patients or their relatives, were undergone thorough physical and clinical examination, detail history of illness, site of hernia, duration and type of hernia (on examination), routine investigations like; blood urea, blood sugar, full blood count, urine routine examination, hepatitis screening (HBsAg, HCV Anti-bodies), X-ray chest and electrocardiogram were performed in all patient. Patients were kept empty stomach after 12:00 midnight and were operated on next day elective surgery list. Antibiotics (Amoxycillin/clavulanic acid) were given at the time of induction of anesthesia, 08 hours and 16 hours post operatively. Postoperatively patients were kept nil per oral till full recovery from

anesthesia, analgesics (tramadol injectable) 12 hourly for first 24 hours, intravenous fluids till orally allowed. During the operation site, type of hernia and other information were noted. After the operation, all these patients were followed up in the ward and on follow up visits for any postoperative complication such as wound infection, hematoma, seroma, and pain. Patients were discharged on 1st postoperative day on oral antibiotics, analgesics and instructions for follow up on 02nd week and 01 month.

After discharge from hospital these patients were advised to come to out-patient department if any complication seen at operation site. All these patients were regularly followed up in the Out-patient Department on 02nd week and 01 month after operations for early complications of mesh repair of inguinal hernia, as early postoperative complications may be seen in the 1st month of operation.

All these information regarding the early postoperative complications and other demographic features like, name, age, address, were also recorded in a proforma specially designed for this purpose.

All the studied variables like type of hernia, site of hernia, postoperative complications like; wound infection, hematoma, seroma, pain, were analyzed for descriptive statistics. Frequencies, percentages were calculated for all these variables and all these data was presented in graphs and tables. Mean and $\pm$ standard deviation was calculated for age. All the data analysis was done by computer program SPSS version 12 for windows.

RESULTS:

A total of 100 male patients with primary and recurrent inguinal hernias were subjected to hernia repair with prolene mesh in this study.

In this study the age of the patients was ranged from 20-80 years with mean age of $48.11 \pm S.D$ 16.47 years. Majority of patients, 23 (23%) were in the age range of 51-60 years.

The right side hernia was founded in majority 62 (62%) cases and in 38 (38%) cases left side hernia was found. In majority, 55 (55%) cases indirect inguinal hernia and in 45 (45%) cases direct inguinal hernia had found. Primary inguinal hernia had been reported in majority 97 (97%) cases and recurrent hernia was reported in 03 (03%) cases (Table No. 1).

TABLE NO. 1: VARIOUS DEMOGRAPHIC FEATURES OF PATIENTS (n=100)

Among the early postoperative complications at 2 weeks follow up, wound hematoma was found in 10% cases, seroma in 09%, wound discharge in 02% cases, early postoperative pain in 12%, urinary retention in 06%, and scrotal swelling was recoded in 03% cases.

Among the general complications at 2 weeks follow up, chest infection was observed in 02% cases, deep venous thrombosis in 01%, and urinary tract infection in 04% cases (Table No.2).

AGE RANGES	NO. OF CASES	PERCENTAGE
Age ranges:	04	04%
20 years		
21 – 30 years	19	19%
31 – 40 years	11	11%
41 – 50 years	22	22%
51 – 60 years	23	23%
61 – 70 years	18	18%
71 – 80 years	03	03%
Side of hernia:		
Right side hernia	62	62%
Left side hernia	38	38%
Type of hernia:		
Indirect	55	55%
Direct	45	45%
Kind of hernia:		97%
Primary	97	
Recurrent	03	03%

TABLE NO. 2:
POSTOPERATIVE COMPLICATIONS AT
2 WEEKS FOLLOW UP IN PATIENTS
(N=100)

POSTOPERATIVE COMPLICATIONS	NO. OF CASES	PERCENTAGE
Early:		
Postoperative pain	12	12%
Wound hematoma	10	10%
Seroma	09	09%
Urinary retention	06	06%
Scrotal swelling	03	03%
Wound discharge	02	02%
General complications:		
Urinary tract infection	04	04%
Chest infection	02	02%
Deep venous thrombosis	01	01%

Among the early postoperative complications at 1st month follow up, wound hematoma was found in 06% cases, seroma in 04%, wound discharge in 01% case, early postoperative pain in 07%, urinary retention in 03%, and scrotal swelling was recorded in 01% case.

Among the general complications at 1st month follow up, chest infection was observed in 01% case and urinary tract infection in 01% case (Table No. 3).

TABLE NO. 3:
POSTOPERATIVE COMPLICATIONS AT
1ST MONTH FOLLOW UP IN PATIENTS
(N=100)

POSTOPERATIVE COMPLICATIONS	NO. OF CASES	PERCENTAGE
Early:		
Postoperative pain	07	07%
Wound hematoma	06	06%
Seroma	04	04%
Urinary retention	03	03%
Scrotal swelling	01	01%
Wound discharge	01	01%

General complications:		
Urinary tract infection	01	01%
Chest infection	01	01%

DISCUSSION:

The Lichtenstein anterior tension free mesh repair is widely regarded as the gold-standard hernia operation. It is easy to learn, reproducible and carries a low complication rate.²⁰

Inguinal hernia repair is one of the most commonly performed surgical procedures. Although the disease is associated with considerable morbidity, mortality is rare, except in remote areas, where delay in treatment can lead to strangulation and death.⁵

The repair of abdominal wall defects in potentially contaminated or grossly infected fields presents a difficult clinical problem. Polypropylene mesh is relatively contraindicated in these settings because of the potential for chronic infection.²¹

Inguinal hernia is more likely to occur in men than in women because the spermatic cord passes through the abdominal wall in the inguinal region, leaving a site of natural weakness prone to hernia formation.⁴ Results of a local study conducted at Lady Reading Hospital, Peshawar, also selected male patients.²² Therefore, in this study we have selected 100% males who were operated for inguinal hernia.

Old age can not be considered as an absolute risk factor in the surgical treatment of inguinal hernia, which can also be stated for the majority of elderly people pathologies. The modern tension-free techniques have demonstrated in cardiopath patients the same advantages which have observed in elderly non cardiopath patients.²³ In our series of 100 patients mean age was 48.11 ± 16.78 years, which is comparable to other local studies.^{9,11} In our study there were 45% patients in the age ranges of 51-80 years. There was no mortality in any age group in this

series. Same results are also reported by a local study, which was conducted at Lady Reading Hospital, Peshawar, in which all patients were male with mean age of 49 years.²²

While few local and international studies reported mean age of > 60 years in their studies.^{24,25} Differences in mean ages are probably due to sample selection criteria of various studies according to their inclusion criteria, as we have included patients from 20 years to 80 years, whereas in few studies they included older age patients e.g. from 40 to 90 years.

In one local study indirect hernia was present in 305 (65.5%) patients while 160 (34.5%) patients had direct hernia.⁹ While in another local study 51 (78.4%) patients had direct while fourteen (21.6%) patients had indirect recurrence.¹¹ In this series out of 100 cases, indirect hernia was found in majority 55% cases and in remaining 45% cases direct hernia was found.

Hernia can in any side or both sides. Results of a local study showed that out of a total number of 50 patients 37 had right sided inguinal hernia and 13 had left sided inguinal hernia.²²

In another study out of a total of 204 inguinal hernias, right side was found in 115 (56.4%) cases; and left side in 89 (43.6%) cases.²⁶

Chronic pain is common after primary inguinal hernia repair in young males, but there is no difference in the pain associated with open mesh and non-mesh repair.²⁷

Postoperative increasing pain was complained by 12% cases of our study at 2nd week follow up, which is comparable with other national studies. It has been reported in one Pakistani study that the postoperative pain was complained in 10% patients of mesh repair and 7.1% in patients of Bassini's repair.⁵ In another national study it has been reported that chronic pain was observed in 9% patients at 1 month and 6% at 6 months for mesh repair post-operatively.²⁸ It was reported to

be 6% for prolene mesh and 8% for nylon darn in an international study.²⁹ While in our study at 1st month follow up, postoperative pain was recorded in 6% cases, which is comparable with an international study.²⁹

In a recent study the Lichtenstein inguinal hernioplasty was performed in 406 patients with non-complicated unilateral inguinal hernia. During reconstruction, the mesh was fixed to the inguinal canal floor without stitching its upper margin to the internal oblique muscle. Control of postoperative pain proved to be satisfactory; 72 hours after surgery, 26.1% of patients no longer felt any pain, whereas 54.4% had slight pain without the need for painkillers; on day 7, 92.8% felt no pain at all. After 10 days, 86.7% of those with sedentary jobs were able to return to work, whereas 79.1% of those with heavier jobs resumed work in 11 to 15 days. This modification of the original Lichtenstein procedure permitted investigators to obtain satisfactory results with regard to the control of postoperative chronic pain and a rapid reprisal of normal working activity.³⁰

The goals of a successful hernia repair include low recurrence rates, permanent relief of pain or discomfort and low incidence of peri and postoperative complications, such as wound infections and intra-abdominal adhesions.³¹

In a study of the 97 patients, the most commonly recorded risks included infection (100%) and bleeding (100%). Serious complications such as chronic pain (consented for at an average of 14%), testicular complications (45.3%) and visceral injury (52.1%) were poorly accounted for at all levels.³²

Wound infection was observed in our study in 02% patients at 2nd week follow up and at 1st month it was recorded in only 01% case. Wound infection was superficial and was managed with antiseptic dressing and antibiotics. No patient required mesh removal for control of infection. Our findings are comparable with a local study in which the incidence of wound infection

reported as 7.5%.³³ In few other local studies the incidence of wound infection has been reported from 1% to 4% cases.^{5,29,34-36}

Among the early postoperative complications; wound hematoma was found in 10% cases, seroma in 09% cases, urinary retention in 06% cases and scrotal swelling was recorded in 03% cases at 2nd week follow up. Among the general complications; chest infection was observed in 2% cases, deep vein thrombosis in 01% case and urinary tract infection in 04% cases.

While at the 1st month follow up less postoperative complications were seen in patients of this study. Wound hematoma was recorded in 06% cases, seroma in 04% cases, urinary tract infection in 03% cases, and scrotal swelling was noted in 01 case. Among the general complications; chest infection was observed in 01% case, urinary tract infection was also recorded in 01% case.

In a study, 3 intraoperative complications (a wound hematoma requiring return to the operating room, postanesthetic hypertension, and an ilioinguinal nerve injury) were reported in all patients who received surgical repair (0.8%). Postoperative complications (90 events) reported in 85 patients (22.3%) included wound hematomas (23 [6.1%]), scrotal hematomas (17 [4.5%]), urinary tract infections (8 [2.1%]), wound infections (7 [1.8%]), orchitis (6 [1.6%]), seromas (6 [1.6%]), urinary retention (1 [0.3%]), and other minor complications (22 [5.8%]).³⁷

Results of another local study showed that wound seroma developed in 8.4% patients in Lichtenstein tension free mesh repair (Group B); 3.1% patients in group B developed haematoma. Abscess formation was noticed in 1.9% patients in group B. Urinary retention developed in 4.6% patients in group B. Numbness or pain in the groin was complained by 10% patients in group B. Recurrence developed in 2(0.8%) patients in group B.⁵

In a study done at Lady Reading Hospital, Peshawar, Pakistan, a total of 300 patients were enrolled at the department of Surgery. Clinical or operative evidence of nerve injury to the Ilioinguinal nerve was observed in five cases (4.5%) of group 1 and four cases (2.8%) of group 2. More importantly the number of cases of hematoma formation and seroma formation in both the groups was similar. During the entire study 10 patients in all went into urinary retention; three of them required transient catheterization. Six patients (5.4%) were in group 1 and four (2.8%) were from group 2. Recurrence was in five cases overall at one year duration, 2 patients (1.8%) were from group 1 and 3 patients (2.1%) were from group 2, while only two patients complained of pain.³⁸

Another local study reported that minor wound infection was noted in two cases and seroma formation in one case. There were two cases of recurrence during initial follow up of one year. At the end they concluded that tension free mesh repair is the procedure of choice for inguinal hernia repair.²²

CONCLUSIONS:

We strongly recommended that propylene mesh repair is the first treatment option for patients with primary and recurrent inguinal hernias as it is safe, better procedure causing minimal complications, but must be covered with good antibiotics preoperatively.

REFERENCES

1. Kingsnorth AN, Giorgobiani G, Bennett DH. Hernias, umbilicus and abdominal wall. In: William NS, Blustrode CJK, O'Connell PR, eds. Bailey & Love's short practice of surgery. 25th ed. London: Hodder Arnold, 2008:968-90.
2. Ali M, Habiba U, Hussain A, Hadi G. The outcome of darn method of inguinal hernia repair using polypropylene in a district general hospital. J Postgrad Med Inst 2003;17:42-5.
3. Khan M, Khan SM, Sharafat S, Khan Z. Inguinal herniorrhaphy with Vicryl darn: experience with 1150 cases. J Postgrad Med Inst 2006;20:44-7.
4. Majeed S, Mehmood K. Repair of inguinal hernia with Lichtenstein technique. Pak Armed Forces Med J 2005;55:95-8.

5. Iqbal P, Sheikh NA. Postoperative complications of inguinal hernia repair. *Med Channel* 2006;12:33-5.
6. Go PM. What is next in inguinal hernia surgery. *Surg Technol Int* 2006;15:116-9.
7. Gourgiotis S, Germanos S, Stratopoulos C, Moustafellos P, Panteli A, Hadjiyammakis E. Lichtenstein tension-free repair of inguinal hernia. *Chirurgia (Bucur)* 2006;101:509-12.
8. Bringman S, Wollert S, Osterberg J, Smedberg S, Granlund H, Heikkinen TJ. Three-year results of a randomized clinical trial of lightweight or standard polypropylene mesh in Lichtenstein repair of primary inguinal hernia. *Br J Surg* 2006;93:1056-9.
9. Farooq O, Batool Z, Bashir-ur-Rehman. Prolene Darn: safe and effective method for primary inguinal hernia repair. *J Coll Physicians Surg Pak* 2005;15:358-61.
10. Holzheimer RG. Low recurrence rate in hernia repair - results in 300 patients with open mesh repair of primary inguinal hernia. *Eur J Med Res* 2007;12:1-5.
11. Farooq O, Bashir-ur-Rehman. Recurrent inguinal hernia repair by open preperitoneal approach. *J Coll Physicians Surg Pak* 2005; 15: 261-5.
12. Holzheimer RG. Low recurrence rate in hernia repair. *Eur J Med Res* 2007;12:1-5.
13. Bringman S, Heikkinen TJ, Wollert S, Osterberg J, Smedberg S, Granlund H, et al. Early results of a single-blinded, randomized, controlled, Internet-based multicenter trial comparing prolene and Vyprow II mesh in Lichtenstein hernioplasty. *Hernia* 2004;8:127-34.
14. Perez AR, Roxas MF, Hilvano SS. A randomized, double-blind, placebo-controlled trial to determine effectiveness of antibiotic prophylaxis for tension-free mesh herniorrhaphy. *J Am Coll Surg* 2005; 200: 393-7.
15. Terzi C. Antimicrobial prophylaxis in clean surgery with special focus on inguinal hernia repair with mesh. *J Hosp Infect* 2006;62:427-36.
16. Taneli F, Aydede H, Vatansever S, Ulman C, Ari Z, Uyanik BS. The long-term effect of mesh bioprosthesis in inguinal hernia repair on testicular nitric oxide metabolism and apoptosis in rat testis. *Cell Biochem Funct* 2005;23:213-20.
17. Ansaloni L, Catena F, D'Alessandro L. Prospective randomized, double-blind, controlled trial comparing Lichtenstein's repair of inguinal hernia with polypropylene mesh versus Surgisis gold soft tissue graft: preliminary results. *Acta Biomed Ateneo Parmense* 2003;74(Suppl 2):10-4.
18. Rodrigues AJ Jr, Jin HY, Utiyama EM, Rodrigues CJ. The Stoppa procedure in inguinal hernia repair: to drain or not to drain. *Rev Hosp Clin Fac Med Sao Paulo* 2003;58:97-102.
19. Kendall C, Murray S. Is watchful waiting a reasonable approach for men with minimally symptomatic inguinal hernia? *Can Med Assoc J* 2006;174:1263-4.
20. Dasari B, Grant L, Irwin T. Immediate and long-term outcomes of Lichtenstein and Kugel patch operations for inguinal hernia repair. *Ulster Med J* 2009;78:115-8.
21. Ueno T, Pickett LC, de la Fuente SG, Lawson DC, Pappas TN. Clinical application of porcine small intestinal submucosa in the management of infected or potentially contaminated abdominal defects. *J Gastrointest Surg* 2004;8:109-12.
22. Naeem M, Khan SM, Qayyum A, Jan WA, Jehanzeb M, Mehmood K. Recurrence of inguinal hernia mesh repair. *J Postgrad Med Inst* 2009;23:254-7.
23. Frazzetta M, Di Gesu G. Inguinal hernia surgery performed on elderly cardiopath patients. *Acta Biomed Ateneo Parmense* 2005;76(Suppl 1):42-5.
24. Malik AM, Khan A, Talpur KAH, Laghari AA. Factors influencing morbidity and mortality in elderly population undergoing inguinal hernia surgery. *J Pak Med Assoc* 2010;60:45-7.
25. Sinha S, Srinivas G, Montgomery J, DeFriend D. Outcome of day-case inguinal hernia in elderly patients: how safe is it? *Hernia* 2007;11:253-6.
26. Suzuki S, Furui S, Okinaga K, Sakamoto T, Murata J, Furukawa A, et al. Differentiation of femoral versus inguinal hernia: CT findings. *AJR Am J Roentgenol* 2007;189:W78-83.
27. Bay-Nielsen M, Nilsson E, Nordin P, Kehlet H. Swedish Hernia Data Base, the Danish Hernia Data Base. Chronic pain after open mesh and sutured repair of indirect inguinal hernia in young males. *Br J Surg* 2004;91:1372-6.
28. Mirza MKN, Hameed F, Sheikh MS, Bashir M. Ilioinguinal neurectomy in open inguinal hernia mesh repair. *Ann KE Med Coll* 2005;11:404-6.
29. Koukorou A, Lyon W, Rice J, Wattchow DA. Prospective randomized trial of polypropylene mesh compared with nylon darn in inguinal hernia repair. *Br J Surg* 2001;88:931-4.
30. Fricano S, Fiorentino E, Cipolla C, Matranga D, Bottino A, Mastrosimone A, et al. A minor modification of Lichtenstein repair of primary inguinal hernia: postoperative discomfort evaluation. *Am Surg* 2010;76:764-9.
31. Goldenberg A, Matone J, Marcondes W, Herbella FA, Farah JF. Comparative study of inflammatory response and adhesions formation after fixation of different meshes for inguinal hernia repair in rabbits. *Acta Cir Bras* 2005;20:347-52.
32. Hoosein MM, Towse H, Conn G, Stoker DL. Consenting practice for open inguinal hernia repairs - are we failing to warn patients of serious complications? *Ann R Coll Surg Engl* 2008;90:643-6.

33. Baluch GMK. Inguinal hernia repair under local anaesthesia. J Surg Pak 2001;6:2-3.
34. Jan WA, Ghani A. Synthetic mesh repair of inguinal hernia under local anaesthesia. J Postgrad Med Inst 2001;15:157-60.
35. Jilani SA, Khan SA, Oonwala ZG. Inguinal hernia repair using mesh at Abbasi Shaheed Hospital. Pakistan J Surg 2000;16:22-4.
36. Bhopal FG, Zafarullah I, Khan JS, Iqbal M. Shouldice versus Lichtenstein hernia repair: comparison of post-operative complications. Pakistan J Surg 2002;18:21-6.
37. Fitzgibbons RJ Jr, Giobbie-Hurder A, Gibbs JO, Dunlop DD, Reda DJ, McCarthy M Jr, et al. Watchful waiting vs repair of inguinal hernia in minimally symptomatic men: a randomized clinical trial. JAMA 2006;295:285-92.
38. Khan N, Bangash A, Sadiq M, Ul Hadi A, Hamid H. Polyglactine/ polypropylene mesh vs. propylene mesh: is there a need for newer prosthesis in inguinal hernia? Saudi J Gastroenterol 2010;16:8-13.

For correspondence:

Dr. Bakht Sarwar

Senior district surgeon,
District Headquarters Hospital,
Timergara, District Lower Dir,
Khyber Pakhtunkhwa.

Cell No. 03005799019, 03449018148

Email: sarwars2001@yahoo.com