

OUTCOME OF DARN REPAIR WITH POLYPROPYLENE FOR PRIMARY INGUINAL HERNIA: AN EXPERIENCE OF 837 CASES

Mohammad Nasir^{✉1}, Sohail Aziz Paracha², Ishtiaq Ali Khan³, Mohammad Tahir⁴, Khizar Wahab²

ABSTRACT

Objective: To determine the outcome of Darn repair for primary inguinal hernia in terms of postoperative complications and recurrence rate.

Methodology: We studied 837 patients having primary inguinal hernia. This descriptive study was conducted at Surgical Department Agency Headquarter Hospital Ghallanai at Mohmand Agency and District Headquarter Hospital, Kohat. Adult patients of both genders, who underwent standard open hernia repair with Prolene darn from June 2005 to June 2010, were included in the study. Out of 837 cases 712 were operated under spinal anesthesia, 08 under local anesthesia and 117 under general anesthesia. Patients were followed up at one week, one month, six month and one year postoperatively for any complication. Data was analyzed by using software SPSS-14.

Results: Out of 837 operated cases 820 (98.96%) were males and 17 (2.03%) were females with male to female ratio of 48:1. Age ranged from 21-88 with mean of 49 ± 17.18 years. Indirect hernia, direct hernia and pantaloon hernia were seen in 623 (74.50%), 211 (25.20%) and 3 (0.30%) cases respectively. Twenty one (2.5%) patients went into postoperative urinary retention. Postoperative wound infection occurred in 13 (1.55%) and scrotal hematoma in 5 (0.60%) cases. Out of 837 patients, 157 (18.76%) patients were lost to the follow up. Recurrence rate was 0.48% (n=4). No mortality was found in this study.

Conclusion: Posterior wall strengthening with polypropylene darn in patients with primary inguinal hernia has excellent outcome and its results are comparable to any well reputed repair.

Key Words: Primary Inguinal hernia, Polypropylene Darn Repair, Outcome.

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¹ District surgical specialist, DHQ Hospital KDA, Kohat, Pakistan.

Email: drmohammadnasir70@gmail.com

² Department of Anatomy, Khyber Medical University (KMU), Institute of Medical Sciences (KIMS), Kohat, Pakistan.

³ Assistant Professor Surgery, Ayub Medical College, Abbotabad, Pakistan

⁴ Department of Surgery, KMU Institute of Medical Sciences (KIMS), DHQ Hospital KDA, Kohat, Pakistan

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groin hernias including the inguinal hernia is the failure of the fascia transversalis to retain the peritoneum (a fact supported by the evidence that adult male inguinal hernias are associated with impaired collagen metabolism and weakening of fibro-connective tissue of the groin).³ The technique of inguinal hernia repair is very demanding and in spite of various procedures adopted and advocated by different authorities from time to time, the best procedure has yet to be discovered⁴.

In 1887, Bassini first performed hernioplasty in which the conjoint muscle/tendon is approximated with the inguinal ligament using interrupted sutures, and since then new techniques are being developed, all aiming at strengthening the posterior wall of inguinal canal. During the last two decades, Lichtenstein mesh repair has gained popularity and has been commonly practiced in west⁵ for its lower recurrence rate⁶. However, mesh is expensive; it is a foreign body and may require removal in case of infection⁷. Shouldice technique of herniorrhaphy was subsequently popularized for its low recurrence rate (<1%) but it is associated with a relatively long learning curve⁸ and is technically difficult⁹.

Moloney GE in 1948 introduced Darn repair of primary inguinal hernia with similar results in terms of low recur-

INTRODUCTION

Inguinal hernia by definition is protrusion of an organ or part of an organ through the inguinal canal. Two third of inguinal hernias are indirect. These are common worldwide accounting for 75% of all types of hernias in the body and are usu-

ally seen in 30-59 years of age¹ affecting males more than the females in a ratio of 20:1². Inguinal hernia repair is one of the most commonly performed general surgical procedures throughout the world. Several various surgical techniques are being practiced throughout the world to treat these hernias. The basic cause of all

rence rate of 0.8%¹⁰. It is cheap, easily performed and results are comparable to mesh or Shouldice repair. It is also based on the same principles of strengthening or reconstructing the posterior inguinal wall. Darn results in the formation of a tension free lattice framework on which fibrous tissue layer is laid, thus resulting in the reinforcement of the weakened posterior inguinal wall.¹¹ As compared to mesh, the darn repair is associated with minimal infection rate (less amount of foreign material is deposited in the wound), less postoperative pain, acceptable recurrence rate, cost effectiveness and it can be easily performed under spinal anesthesia.¹²

Laparoscopic inguinal hernia repair was introduced in 1982 by Ger and was popularized in the beginning to be the procedure of choice but its routine use is still questionable and controversial¹³. It has proved not to be cost effective for routine use by a meta-analysis trial for the evaluation of laparoscopic hernia repair¹⁴. Hence the National Institute for Clinical Excellence (NICE) in the United Kingdom recommends laparoscopic hernia repair for recurrent and bilateral inguinal hernia only¹⁵.

Keeping in view the aforementioned benefits of darn repair with polypropylene, it appears to be a satisfactory and ideally acceptable method where operative cost is a major consideration. Hence this study was conducted to determine darn repair for primary inguinal hernia in our set up in terms of postoperative complications and recurrence rate.

METHODOLOGY

This descriptive study was conducted at Surgical Department, Agency Headquarter Hospital Ghallanai at Mohmand Agency and District Headquarter Hospital, Kohat Pakistan from June 2005 to June 2010. Total of 837 patients over the age of eighteen years with primary inguinal hernia were included in the study. All the cases were subjected to standard open hernia repair with Prolene darn.

Written consent was taken and study had been approved priorly by the ethical committees of the hospital. Diagnostic Criteria included a bulge in the groin appearing with or without cough. Exclusion Criteria included asthmatics, diabetics, patients for non-compliance in follow up, obese with BMI > 35, moribund patients with ASA grade III and above.

All the patients were admitted before surgery, worked up by relevant investigations and were operated the next day as elective cases except those presenting with irreducible and obstructed hernias (5.50%) who presented as emergency and were operated on the same day. All the patients underwent inguinal herniorrhaphy following the similar steps as in other hernia repairs including strengthening of the posterior wall of inguinal canal by darn repair using polypropylene (Prolene) size I suture. Hernia repair was done under general, spinal or local anesthesia as decided by surgeon, the anesthetist and condition of the patient. Most of the patients were operated by using spinal and local anesthesia. General anesthesia was used in some of the patients for either in complicated cases like obstruction and strangulation or upon the request of the patient. In case of bilateral inguinal hernia, only one side was operated upon i.e. either larger or symptomatic was operated at a time and the other side was operated 3 months later to avoid high risk of recurrence and other complications. The parts were shaved on the O.T table. All the patients received 1.5 grams Cefuroxime injections intravenously preoperatively before the induction of anesthesia and then 8 and 24 hours postoperatively except in those who underwent gut resection with anastomosis who were added metronidazole with cefuroxime for three days in three divided doses postoperatively. Verbal pain Score¹⁶ was maintained for all patients and was recorded by staff nurses 24 hours and 48 hours after operation and some form of analgesia was given according to severity of pain. All patients were discharged

the next day except those who had gut resection with anastomosis and infection who stayed for an average of five days (maximum 12 days). Patients were advised not to engage in heavy work or hard labor for 12 weeks. Patients were re-examined on 7th and 14th postoperative day for early complications. Follow up was done at one month, 3rd month, 6th month and 1 year for any delayed postoperative complications. Data was collected prospectively on an especially designed structured proforma including patient's demographics, medical history, presentation, any post-operative complications, and length of hospital stay. All the studied variables were analyzed for descriptive statistics like frequencies and percentages by using statistical package for social sciences (SPSS) Windows version 14.

Technique of darning

Standard inguinal incision was given in all the cases and inguinal canal was opened. The nature of hernia was assessed after delivering the sac. The sac was either incised or reduced and the gapping internal ring was narrowed where required. The posterior wall of inguinal canal was then strengthened with Prolene darn. Polypropylene (Prolene) size I strength mounted on round bodied atraumatic needle was used as a suture. The continuous suture began at the medial end of repair by taking good bite of fascia over pubis, medial end of inguinal ligament and lowest portion of medial end of rectus sheath. This suturing continued laterally in simple over and over fashion in the form of figure of eight approximating the lower edge of conjoint tendon/muscle to the upper edge of lower part of inguinal ligament without tension. Good bites of inguinal ligament were caught on the tip of needle to safeguard the femoral vessels and at various levels in order to avoid the tearing of inguinal ligament. This is continued slightly beyond the internal inguinal ring by displacing the spermatic cord laterally. The same suture then took the reverse

direction as a second layer of darn and was tied medially at the pubic tubercle. Then cord was placed on darn and anterior wall of inguinal was reconstituted followed by closure of subcutaneous tissues and skin. Homeostasis was secured with diathermy and no drain was used.

RESULTS

A total of 837 cases of inguinal hernias were operated in five years of study. The age ranged from 20-88 years with mean age of 49 ± 17.18 years. Males were predominantly affected by inguinal hernia with male to female ratio of 48:1 (Table I). Right sided hernia was observed in 578(69.05%), left sided hernia in 228

(27.24%) and bilateral hernia in 31 (3.71%) patients. Indirect hernias were present in 623 (74.4%) patients, direct hernias in 211 (25.2%) and pantaloon type in 3(0.35%) patients. In case of indirect variety, bubonocoele subtype was observed in 193 (30.97%), funicular in 351 (56.34%) and scrotal in 79 (12.69%) cases. In case of direct hernia, 19 (9.00%) cases were of sliding variety and 192(91%) cases were of scrotal subtype. Reducible hernia was present in 791(94.50%) patients while 46(5.50%) cases were of irreducible type. All the irreducible hernias were of indirect variety and were operated urgently and were found to be obstructed. Thirty four

cases were having non-viable gut and underwent gut resection with anastomosis followed by darn repair of the posterior inguinal wall.

Intra-operative complications mainly included hypotension which was seen in 2 (0.28%) patients who were operated under spinal anesthesia. Those cases were managed by IV fluids and 30 mg ephedrine. Five (4.27%) patients who underwent repair under general anesthesia developed chest infection and were treated conservatively by chest physiotherapy, appropriate antibiotics, bronchodilators and cough expectorant where required. Post operatively, 43 (5.13%) patients developed complica-

TABLE I: AGE AND SEX DISTRIBUTION SEEN IN INGUINAL HERNIAS (n= 837)

Age groups	Frequency/Percentage (n=837)	Males (n=790)	Females (n=47)
19-29 years	190 / 22.70	175	15
30-59 years	480/57.35	448	32
60-79 years	150 /17.91	150	Nil
80 years and above	17 / 2.04	17	Nil

TABLE II: COMPLICATIONS OBSERVED IN 837 CASES OF INGUINAL HERNIORAPHY WITH PROLENE DARN.

Complications		Frequency	Percentage
Short Term Complications	Urinary retention	21	2.50%
	Wound infection	13	1.55%
	Chest Infection	5	4.27%
	Scrotal Hematoma	5	0.59%
	Hypotension	2	0.28%
Long Term Complications	Recurrence*	4	0.58%
	Hypertrophic scar*	3	0.44%

*Long Term Complications were calculated in 680 patients available for follow up.

TABLE III: VERBAL PAIN SCORE OBSERVED AT 24 HOURS AND 48 HOURS AFTER INGUINAL DARN REPAIR (n=837)

	Pain severity	Frequency	Percentage
Pain after 24 hours	Mild	530	63.32
	Moderate	180	21.50
	Severe	85	10.15
	None	42	5.01
Pain after 48 hours	Mild	600	71.68
	Moderate	80	9.55
	Severe	20	2.38
	None	137	16.36

tions. Complications observed in the series are given in Table II. Patients with postoperative urinary retention were managed by measures like reassurance, providing privacy to sit on the bed side to void or encouraged to go to washroom. These measures worked only in 4 patients while the rest of them were catheterized for 12 hours. Urinary tract infection did not occur in any catheterized case. Patients with scrotal hematoma were treated conservatively by needle aspiration. This occurred in the scrotal variety of hernia. Superficial wound infection was managed conservatively by stitch removal, regular dressings and antibiotics according to culture and sensitivity. Four cases had undergone gut resection. No testicular complication of considerable significance occurred in the study.

Postoperative pain score was recorded in all the patients by staff nurses at 24 hours and 48 hours after operation which was of mild intensity in majority (75%) of the cases Table III. All patients required and were provided with analgesia aiming to keep them pain free. Out of 837 patients 157 (18.76%) patients were lost to the follow up. Four (0.58%) patients had recurrence of hernias seen after one year. One patient with recurrence became evident at 3rd month, 01 at 6th month and 02 at 1 year follow up. The one that was found at 3rd month follow up examination had developed infection and was of indirect variety. In the one found at 6th month, recurrence probably occurred due to non-compliance in a heavy work laborer and was of direct variety. In the rest of two cases detected at 1 year interval, probably constipation and inherent factors were responsible. These three were of direct variety and occurred just lateral to the pubic tubercle. All the recurrent cases were again operated and had uneventful recovery and have not reported any recurrence till date.

DISCUSSION

An ideal procedure for the repair of inguinal hernia should be the one that effectively deals with all range of pathologies encountered in all types of inguinal hernias whether direct or indirect, reducible or irreducible, incarcerated or strangulated and a small or big hernial defect. Thus all the procedures described so far are capable of dealing with these problems operatively with no procedure appearing superior to other in any respect. Sir Astely Cooper regarding hernia treatment stated that "No disease of the human body belonging to the province of surgeon requires in its treatment a better combination of anatomical knowledge with surgical skill than hernia in all its varieties"¹⁷. In fact it is not the type of technique rather the quality of technique employed is important.

In our study operation time was on an average of 40 minutes because of simplicity of procedure and this is comparable to other studies^{11,18}. It is performed in less time as compared to other procedures^{7,9,18}. Ali M et al¹² in his study reported 30 minutes while Farooq¹¹ 45 minutes. Less operation time is associated with less infective complications and excellent outcome.

Infection rate in our study was 1.5% which is as low as reported by Bhatti¹⁸ of 1%, 2.4% reported by Farooq O¹¹ and 1.8% by Kingsnorth AN et al¹⁹. Less operation time with small amount of foreign material accounts for low infection rate. All patients of wound infection in our study were managed conservatively. No patient required removal of polypropylene suture as compared to a mesh⁷.

Urinary retention developed in 21 patients but only 17 (2%) required catheterization as compared to 4%¹⁸ and 4.5%¹¹ reported by other researchers. No routine preoperative urinary catheterization has been considered mandatory in darn herniorraphy. It occurred mainly in elderly patients having no preoperative urinary symptoms and in patients with

spinal anesthesia because of inhibition of S2, S3, S4 fibers associated with micturition reflex. Urinary tract infection did not occur in any patient.

In our study postoperative pain was mild and patients did not require prolonged analgesia in majority of the cases so it helped in early mobilization and discharge of the patients. Postoperative neuralgia did not occur in our study as compared to 16% reported by Bhatti AZ.¹⁸ Care was taken to avoid entrapment of ilioinguinal nerve as darn repair was done in the form of figure of eight stitches.²⁰

Darn repair is easily learnt and performed procedure due to its simplicity. Thirty five percent consultants in the United Kingdom use this procedure as compared to 20% who use shouldice and other techniques.²¹ Moreover, shouldice technique requires more supervision as compared to darn repair.¹⁹ Also the learning curve for shouldice technique¹⁹ and laparoscopic repair²² is long.

In terms of cost effectiveness, when compared to Lichtenstein repair^{11,12} and laparoscopic repair²², darn repair is more cost effective than the mesh. Cost effectiveness is a matter of great concern in our community, both for the patients and health care providers as it is achieved with no compromise on the overall recurrence rate and other complications.

Recurrence is usually of direct type and occurs usually in the area of Hasselbach's triangle. So for the full determination of recurrence a long term follow up has been recommended by most of the researchers which is one of the limitations of this study. Recurrence rate in our study was 0.47% (4 patients) which is comparable to recurrence seen other studies.^{12,19,23} Maximum recurrences occur in the first six months²⁴. Recurrence occurring in the first six months is usually due to technical errors like inadequate dissection, tension on tissues and lack of experience of surgeon.^{18,25} After six months, occupational factors or inherent

collagen deficiency is responsible.²⁴ When compared to shouldice technique, darn repair has low recurrence rate as the recurrence rate for shouldice technique in general practice is larger than the original study rate of 1.1%.²⁶

CONCLUSION

Darn herniorrhaphy with Prolene is safe technique for repair of primary inguinal hernia. It has negligible postoperative complications and low recurrence rate. Its excellent results are comparable to any existing well reputed technique for inguinal hernia repair.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

- MN:** Conception and design, acquisition of data, drafting the manuscript, final approval of the version to be published
SAP: Analysis and interpretation of data, drafting the manuscript, final approval of the version to be published
IAK: Acquisition of data, final approval of the version to be published
MT: Critical revision, final approval of the version to be published
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CONFLICT OF INTEREST

Author declares no conflict of interest

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