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COMPARING DIFFERENT APPROACHES OF INGUINAL HERNIA REPAIR UNDER SPINAL ANAESTHESIA

General Surgery

Dr. Aditya Damani Assistant Professor, Dept. of Surgery, Rural Medical College, Loni.
Dr. Shraddha Mundra* Associate Professor, Dept. of Anaesthesia, Rural Medical College, Loni.
*Corresponding Author

ABSTRACT

Introduction: Our study compares three open surgical techniques of inguinal hernia repair under spinal anaesthesia.
Methods: 128 patients with uncomplicated unilateral primary inguinal hernia were randomly selected either for Shouldice repair (35), Lichtenstein repair (52) or mesh plug and patch repair (41), after obtaining operative fitness under spinal anesthesia.
Result And Conclusion: Considering less cost, better outcome and earlier return to work Lichtenstein mesh repair is more cost-effective.

KEYWORDS

Inguinal hernia repair, spinal anesthesia, Shouldice repair, Lichtenstein repair, mesh plug and patch repair.

INTRODUCTION

A hernia is abnormal protrusion of a viscus, in part or in whole, through an opening, anatomical or pathological, in the walls of its containing cavity [1].

75% percent of all abdominal wall hernias are found in the groin. Of all groin hernias, 95% are hernias of the inguinal canal with remainder being femoral hernia defects [2].

Evolution in the treatment of inguinal hernias has paralleled technologic developments in the field. The most significant advances to impact inguinal hernia repair have been the addition of prosthetic materials to conventional repairs and the introduction of laparoscopy to general surgical procedures.

In our institution, inguinal hernia repair is one of the common surgeries performed. This study aims at comparing three open surgical techniques for inguinal hernia repair - the Shouldice repair, the Lichtenstein repair and Mesh plug and patch repair.

AIMS AND OBJECTIVES

1. To study inguinal hernia with respect to age, sex, risk factors and clinical presentation.
2. To compare efficacy of various operative methods of open surgical repairs of inguinal hernias (the Lichtenstein mesh repair, mesh plug and patch repair and the Shouldice repair).

Efficacy here means –

1. Recurrence free period.
2. Cost effectiveness in rural setup.
3. Post operative complications.

3. To analyze impact of factors like bronchial asthma, BPH, constipation, etc on outcome of operation.

Inclusion Criteria:-

Patients presenting to our college hospital with uncomplicated inguinal hernia.

Exclusion Criteria:-

1. All patients under age of 18 years.
2. Recurrent inguinal hernias.
3. Complicated inguinal hernias.

Anatomy Of Inguinal Canal

The inguinal canal in the adult is an oblique rift in the lower part of the anterior abdominal wall. It measures approximately 4 cm in length. It is located 2 to 4 cm above the inguinal ligament, between the opening of the external (superficial) and internal (deep) inguinal rings.

Etiopathogenesis [3]

The cause of hernia is probably multifactorial. It is assumed that 3 main factors are involved - presence of preformed sac, repeated elevation in the intra abdominal pressure and weakening of body muscles and tissues.

1. Congenital and anatomical factor like patent processus vaginalis:
2. Raised intra-abdominal pressure
3. Integrity of the fascia transversalis
4. General contributing factors like weakening of muscle and fascia by advancing age, lack of physical exercise, obesity and multiple pregnancies.

Components Of Inguinal Hernia [4,5]

The Sac: Different parts of the Hernia Sac

A. Mouth: This is path between the sac interior and the abdominal cavity

B. Neck: This is narrowest section between the mouth and the body of sac.

C. Body: It lies between the neck and the fundus.

D. Fundus: This is the blind end or the distal most part of the sac.
Contents of Hernia: Can be almost any abdominal viscous, except the liver.

Classification Of Inguinal Hernia
Indirect inguinal hernia

An indirect hernial sac is actually a dilated persistent processus vaginalis. It passes through the deep ring, lies within the spermatic cord and follows the indirect course of the cord to the scrotum.

Direct inguinal hernia

The direct inguinal hernial sacs originate through the floor of the inguinal canal i.e., Hasselbach's triangle, they protrude directly and they are contained by the aponeurosis of the external oblique muscle.

Clinical Presentation And Examination Of Inguinal Hernia [6]
Symptoms

1. Pain / Discomfort:
2. Lump:
3. Systemic symptoms are colicky abdominal pain, vomiting, abdominal distention and constipation.
4. Other complaints like, persistent cough, chronic bronchitis, constipation, straining during micturation due to benign enlargement of prostate, or stricture urethra.
5. Past history: During appendicectomy division of ilio inguinal nerve may lead to weakness of abdominal muscles at the inguinal region and may cause subsequent direct inguinal hernia.

Signs:

Two classical signs of uncomplicated hernias are impulse on coughing and reducibility.

- To get above the swelling differentiates a scrotal from an ingino-scrotal swelling.
- An expansile impulse on coughing in the hernia will be appreciated when the patient is asked to cough. Impulse on coughing will be absent in case of strangulated hernia, irreducible hernia, and obstructed hernia.
- **Ring occlusion test:** After reducing the hernia the deep inguinal

ring is occluded, i.e., half an inch above mid inguinal point .On asking the patient to cough, a direct hernia will show a bulge but an indirect hernia will not.

- **Three Finger Test or Zieman's Technique:** After the hernia has been completely reduced the finger is placed at the site of internal ring, another at the external ring and one on saphenous opening. The patient is asked to cough, when impulse is felt at the internal ring, then it is indirect hernia. If impulse is felt at external ring it is direct hernia and if impulse is felt at saphenous opening it is femoral hernia.
- **Finger invagination Test:** This test is performed to palpate the hernial orifice. After reduction of the hernia, the skin is invaginated from the bottom of the scrotum by little finger, which is pushed up to palpate the pubic tubercle. The finger is then rotated and pushed further up into the superficial inguinal ring. Normal ring is a triangular slit, which admits only the tip of a finger. The patient is asked to cough. A palpable impulse will confirm the diagnosis of hernia. When the finger enters the ring, it goes directly backwards in direct hernia and it goes upwards, backwards and outwards in indirect hernia. The finger is again rotated so that the pulp of the finger looks backwards. The patient is again asked to cough. If the impulse is felt on the pulp of the finger, the hernia is a direct one, if it is felt on the tip, then it is an indirect hernia.

Preoperative Investigations

Careful history taking and thorough physical examination and investigations are of paramount for the assessment of patients for surgery.

A. Laboratory Investigations

1. Complete blood examination for Hb %, Total count, Differential count, Erythrocyte sedimentation rate, Fasting blood sugar, Blood urea and Serum creatinine.
2. Urine analysis for Albumin, Sugar and microscopic organisms.
3. **X-ray chest:** To rule out TB, COPD, Emphysema and Malignancy of lungs.
4. Electrocardiogram in patients above 40 years.

5. Abdomen: USG abdomen, to diagnose inguinal hernia in evaluating patients of groin pain, in acute manifestations of groin swelling, to distinguish incarcerated bowel from acute lymphadenitis, to rule out ascites and size of prostate and residual urine and any other pathology in abdomen. Ultrasonography of the groin regions could be used with great accuracy for precise classification of groin hernias in adults [7].

6. **Roentgen Studies in Hernia**

a. Plain X-Ray Abdomen; In Intestinal obstruction, Incarcerated and Richter's hernia.
b. Barium Enema in sliding hernia.
c. Cystogram and IVP in sliding hernia.
d. Herniography. This investigation is not done in our hospital.

Treatment

Indications for operation [8]

1. All inguinal hernias in children should be repaired without delay because of the risk of complications of incarceration and strangulation. (It has been estimated that the complication rate when operating urgently for a strangulated hernia in a child is 20 times that of a planned surgery).
2. In adults, the risk of a hernia operation is negligible and the recurrence rate, when a good repair has been done, is so small that there is hardly any reason for not operating on all hernias as soon as they are diagnosed.
3. The small, wide necked direct inguinal hernias in elderly patients that pop out and back on coughing can be left alone unless they show signs of growing.

Anaesthesia [8,9]

The choice of anesthesia for open inguinal herniorrhaphy depends on the personal preference of the surgeon. Local anesthesia, when used in adequate doses and far enough in advance, proves very effective, especially in combination with short-acting amnesic and anxiolytic agents. If general anesthesia is used, a local anesthetic should be administered at the end of the procedure as an adjunct to reduce postoperative pain. Spinal or Epidural anesthesia is excellent and is rapidly gaining popularity.

The types of operation for inguinal hernia are usually classified as:

- **Herniotomy:** This is the essential basic operation and it entails dissecting out and opening the hernial sac, reducing any contents and transfixing the neck of the sac and removing the remainder. It is employed as the first step in herniorrhaphy or hernioplasty. By itself is sufficient for the treatment of hernia in infants and adolescents.
- **Herniorrhaphy** refers to the strengthening or reconstruction of the posterior wall of the inguinal canal.
- **Hernioplasty** is the addition of grafts or prosthetics to strengthen the posterior wall.

Prosthetic Materials

The earliest use of manmade prosthetic reinforcements for hernia repair was use of silver wire coils placed on floor of inguinal canal by Phelps in 1894 [10]. Since then many metallic and non metallic prosthetic materials were developed.

The use of metal prostheses had largely been abandoned. These caused postoperative pain due to inflexibility, fragmentation, migration, infection, fistula formation, and difficulty in removal.

Operative Procedures [4]

All modern hernia surgery consists in three phases:

- reaching the sac and the hernia defect.
- treating the sac.
- Posterior wall repair.

The sac and the hernia defect may be reached through three different surgical approaches: inguinal, preperitoneal and transperitoneal.

Commonly Recognized Conventional Inguinal Hernia Repairs [9]

<table>
<tr><th></th><th>Anterior</th><th colspan="2">Preperitoneal</th><th>Combined</th></tr>
<tr><td rowspan="6">Nonprosthetic</td><td>Marcy</td><td colspan="2" rowspan="6">Original Nyhus-Condon (historical interest only now)</td><td rowspan="6"></td></tr>
<tr><td>Bassini</td></tr>
<tr><td>Moloney darn</td></tr>
<tr><td>Shouldice</td></tr>
<tr><td>McVay-Cooper's ligament repair</td></tr>
<tr><td>Miscellaneous</td></tr>
<tr><td rowspan="3">Prosthetic</td><td>Lichtenstein tension-free Hernioplasty</td><td>Anterior approach</td><td>Posterior approach</td><td rowspan="3">Bilayer repair</td></tr>
<tr><td>Mesh plug and patch</td><td>Read-Rives</td><td>GPRVS</td></tr>
<tr><td></td><td></td><td>Kugel</td></tr>
<tr><td></td><td></td><td></td><td>Nyhus-Condon</td><td></td></tr>
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Posterior Wall Reconstructive Procedures

Shouldice Repair [4,11]

The principles of the Bassini repair were revitalized within the Shouldice repair, resulting in superior recurrence rates. Although the shouldice repair is generally grouped with open tissue-based repairs, its success rates are equivalent to that of tension-free repairs in many studies comparing the two approaches.

Resection of the cremaster and opening of the transversalis fascia from the deep ring to the pubic spine are mandatory. Repair is performed with three continuous doubleline ("back and forth") sutures.

Lichtenstein Repair [4,12,13]

In 1984, Lichtenstein described a tension free hernioplasty. The concept was based on degenerative origin of inguinal hernia which results in destruction of inguinal floor and the fact that traditional tissue repair is associated with undue tension at suture line.

Mesh Plug Hernioplasty (robbins And Rutkow Repair) [14]

Robbins and Rutkow used this method to include treatment for all groin hernias, both primary and recurrent. In indirect inguinal hernia, high dissection of the sac is done which is simply placed back through the internal ring into the abdominal cavity. A mesh plug (hand made umbrella plug or prefix plug) is inserted, tapered end first, through the internal ring and placed into position just beneath the crurae. The plug is kept in place by one or two interrupted 3-0 vicryl sutures. In direct hernias, the attenuated transversalis fascia is raised and the sac is circumscribed at its mid portion so as to expose pre-peritoneal fat. This creates an opening in the pre-peritoneal plane, where the plug must intimately lie. All indirect and direct hernias after the mesh plug is put

in situ, is reinforced with a second piece of flat marlex mesh. This Onlay mesh is placed using suture less technique on the anterior surface of the posterior wall of the inguinal canal from the pubic tubercle to above the internal ring.

Complications Of Hernia Repair[4,9]

Postherniorrhaphy Complications After Conventional Repair	
Recurrence	
Chronic groin pain	Nociceptive
	Neuropathic
Cord and testicular	Hematoma
	Ischemic orchitis
	Testicular atrophy
	Injury to the vas deferens
	Hydrocele
	Testicular descent
Bowel and bladder injury	
Osteitis pubis	
Prosthetic complications	Contraction
	Erosion
	Infection
	Rejection
	Fracture
Miscellaneous complications	Seroma
	Hematoma
	Wound infection

MATERIALS AND METHODS

This study was conducted on 128 patients with uncomplicated unilateral primary inguinal hernia in our college hospital.

All the patients were subjected to, full history taking, thorough clinical examination, routine laboratory investigations, x-ray chest and abdominal ultrasonography if required.

After obtaining operative fitness, patients were randomly selected either for Shouldice repair, Lichtenstein repair or mesh plug and patch repair. 52 patients were operated by Lichtenstein mesh repair, 41 by mesh plug and patch repair and 35 by Shouldice repair. All patients were operated in spinal anesthesia.

Post operatively patients were given i.m diaclofenac sodium injection. Very few patients required injectable tramadol for pain relief. Patients were assessed for pain on post operative day 1. Patients were encouraged to mobilize after 8-10 hours postoperatively and resume there normal activity as soon as possible. Patients were discharged from hospital once they felt comfortable and confident to go home. Dressings if normal were checked on post operative day 3 for evidence of hematoma, seroma and infection if present. Hematomas and seromas were managed conservatively and did not need drainage. Infections were superficial and subsided with oral antibiotics.

Patients were encouraged to follow up by physical examination after 1month, 3 months, 6 months and 1 year. If they couldn't follow up then they were asked about complaints if any by telephonic conversation. 28 patients were lost to follow up and they couldn't be contacted. All patients were physically examined at 1 year. On follow up patients were inquired about day of return to work.

Patients having chronic pain were not affected by pain in routine activities. They were managed by oral analgesics. At the end of 1 year follow up, 3 patients developed recurrent hernia. Two were treated with mesh repair and one patient refused operation.

The collected data was organized, tabulated and statistically analysed.

RESULT

- In our study incidence of hernia was most common in men of age 40-50 yrs (39 pts ;30.5%).
- The commonest presenting complaint was swelling in 85.9% of patients.
- Most of hernias in our study were of recent onset of < 1 yr (61.7%).
- In our study 83 pts (64.8%) had indirect hernia, while in 40 pts (31.3%) hernias were direct hernia. 5 pts (3.9%) were found to have both direct and indirect hernia (pantaloon hernia) on operation.
- In present study 73 pts (57%) hernia was present on right side and in 55 pts (43%) it was diagnosed on left side.
- Incidence of direct hernia was statistically significant in older age groups.
- In our study straining factors were present in 78 pts (61%). Commonest straining factor being lifting heavy weights in 34 pts (26.6%) followed by straining during micturation in 18 pts (14.1%) and chronic constipation in 16 pts (12.5%). Chronic cough was present in 10 pts (7.8%). Presence of straining factor was statistically significant in higher age groups. All pts in age group 61-70 and 71.4% pts in >70 year age group had presence of straining factor.
- According to BMI grades incidence of hernia was highest 57.8% in healthy weight group (BMI of 18.5- 24.5) followed by 28.1% in over weight group (BMI of 25- 29.99).
- In our study 61 pts (47.5%) were heavy workers and moderate workers being 57 (44.5%). 10 pts (7.8%) were light workers. Heavy workers included farmers and laborers, moderate workers being drivers, teachers and students while light workers being retired and sedentary workers.
- In three groups there was no significant difference between patients in terms of age, BMI, presence of straining factors, type of hernia and poor abdominal muscle tone.
- Post operative pain after 24 hours was most commonly present in Shouldice repair pts (77%), followed by mesh plug and patch (63%) and Lichtenstein repair (60%). Seroma formation was common in mesh repairs with 13.5% in LMR and 7.3% in PR, while only 5.7% in SR. Presence of hematoma was significantly higher in pts treated with Shouldice repair (5.5%) as compared to 1.9% in LMR and 2.4% in PR. Wound infections were equally distributed in three groups with 9.6% in LMR, 11.4% in SR and 7.3% in PR. Scrotal oedema was seen more (9%) in mesh repairs than SR (5.7%). Except hematoma, all other postoperative complications were not statistically significant.
- In our study patients with Lichtenstein mesh repair and mesh plug and patch repair had mean hospital stay of 2.4 days and that repaired by Shouldice method had mean stay of 3.9 days in hospital.
- In present study patients with Lichtenstein mesh repair (21 days) had significantly earlier return to work than mesh plug and patch repair (24 days) and Shouldice repair (30days). Between Shouldice and Mesh plug repair difference of recovery was statistically significant.
- In our study of 128 pts follow up was completed in 100 patients till 1 year. At 1 month, 21 patients had pain/discomfort in groin managed by oral analgesics. At three months 17 pts had pain which reduced to 12 pts at 6 months. At 1 yr follow up 10 patients had chronic pain, 12.5% in LMR, 9.7% in PR, and 7.1% in SR. There was no statistical significance in between the groups.
- In present study of the 3 recurrences noted 2 (7.1%) were treated by Shouldice repair and 1 patient (2.4%) by Lichtenstein mesh repair. There were no recurrences in patients treated with mesh plug and patch repair.
- Straining factors were present in all three pts with recurrences. Bronchial asthama, chronic constipation, lifting heavy weights one in each patient.
- In our study although patients with shouldice repair saved Rs.250 as compared to Lichtenstein mesh repair and Rs.1250 as compared to mesh plug and patch repair, patients had fewer complications in mesh repairs and returned to work 9 days earlier in Lichtenstein mesh repair and 6 days earlier in mesh plug and patch repair as compared to Shouldice repair.

CONCLUSION

Considering less cost, better outcome and earlier return to work Lichtenstein mesh repair is more cost-effective. However long term efficacy could not be established due to short follow up.

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