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Original Research Article

Open Inguinal Hernia Repair: Incidence of Mesh Infection

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Abstract

Introduction: Wound and mesh infections after inguinal hernia repair are very severe complications. Today it is an established fact to repair hernias with meshes in various ways to prevent or delay the recurrence of hernia, but knowledge regarding the incidence of mesh infection is rare. The aim of the study was to assess the incidence of mesh infection in Open Inguinal Hernia Repair. ***Methods***: This retrospective study was conducted at the Department of Surgery, Sylhet M.A.G Osmani Medical College, Sylhet, Bangladesh during the period from January 2020 to December 2021. The study included 400 patients who underwent mesh repair for inguinal hernia repair during the 2 years period. Among the total 400 patients, 24 were diagnosed with mesh related infections. Mesh related infections influenced by type of mesh use; surgical techniques and underlying comorbidity were all recorded. Both medical and surgical management required for mesh infection were also recorded. Use of antimicrobial included coverage of staphylococcus. Laparoscopic hernia repair cases were excluded from the study. ***Result:*** The study found 24 mesh related infection in a total of 400 patients who underwent open inguinal hernia repair. The overall mesh related infection rate was 3%. The infection was established at a variable delay after mesh insertion, with 40% delayed onset after procedure and 60% diagnosed during the first post-operative month. Infection was cured in 6 patients after mesh removal. ***Conclusion:*** Mesh removal appears to be one of the appropriate treatments for this rare and serious complication. The most common pathogen was Staphylococcus aureus and E. Coli. The possibility of a mesh related infection remains active weeks or even years after initial hernia repair. If mesh infection develops it should be treated vigorously and mesh should be excised early if necessary.

Keywords: Hernia, Mesh Infection, Repair.

INTRODUCTION

A hernia is a frequent ailment in which a portion of an internal organ or tissue protrudes through a weak point. Hernias can arise in the groin, around the belly button, through a surgical scar, in the diaphragm, or in the diaphragm. An inguinal hernia occurs when the intestines or fat from the abdomen protrude through the lower abdominal wall into the inguinal, or groin, area [1]. There are two main types of inguinal hernia, indirect inguinal hernia resulting from birth defect, and direct inguinal hernia that are usually caused by straining muscles or heavy lifting, or by weakness of the muscles in the abdominal wall over time. Adult males are more likely than females to get direct inguinal hernia. Inguinal hernias typically manifest as a lump in the groin area that resolves with minor pressure or when the patient is lying down [2]. The pain of an inguinal hernia might be low to moderate at first, but it worsens with activity. For the management of inguinal hernia, surgery is the only available method [3]. The surgery method for treatment of hernia has been continuously improving since the 1800's [4]. The repair of hernia started with the dissection and reconstruction by Bassini, the father of modern herniorrhaphy, where functional anatomy was preserved [5]. Many following surgeons have continued to improve on his work by adding several steps to the initial surgery method [6-9]. Currently, the most common methods used for hernia repair are open surgery and laparoscopy. In both methods, the hernia is usually repaired by either suturing, or by placing a synthetic mesh over the hernia, pushing it back inside the abdominal wall [10]. Instead of using traditional surgical method, the use of prosthetic mesh has reduced the recurrence rate of hernia after a surgical repair to less than 5%, and post-surgery pain has also decreased greatly, leading to a substantial overall improvement [11, 12]. Mesh-related

difficulties, on the other hand, have grown increasingly relevant. Seromas, adhesions, persistent severe pain, mesh migration and rejection, and mesh-related infections are examples of consequences [13]. The mesh infection occurs when there is bacteria growth on the mesh implants, and can cause fever, pain and inflammation. The infection of mesh can occur from one month from the initial surgery, to years after the surgery, largely dependent on the type of mesh used, and the implementation methods [14]. The present study was conducted to observe the incidence of mesh infection in patients who underwent open inguinal hernia repair at the study hospital.

OBJECTIVE

General Objective

- To observe the cases of infection in open inguinal hernia repair.

Specific Objectives

- To observe the prevalence of types of infection among the study participants.

METHODS

This retrospective study was conducted at the Department of Surgery, Sylhet M.A.G Osmani Medical College, Sylhet, Bangladesh during the period from January 2020 to December 2021. In total, 400 patients had undergone open inguinal hernia repair at the study hospital during the study period, among whom, a total of 24 patients had mesh infection. All required data was collected from the available hospital records and patient follow up interviews, and informed verbal consent was obtained from the participants. Ethical approval was obtained from the ethical review committee of the study hospital.

Inclusion Criteria

- Only open inguinal hernia repair.
- Only mesh infection cases.
- Patients who had approved the use of their records for this study.

Exclusion Criteria

- Laparoscopic inguinal hernia repair.
- No mesh infection but surgical site wound infection.
- Exclude those affected with other chronic diseases etc.

RESULTS

Table 1: Initial gender Distribution of all hernia repair cases (n=400)

Gender	Frequency	Percentage
Male	368	92%
Female	32	8%

Among the initial 400 hernia repair cases, 92% were male and 8% were female.

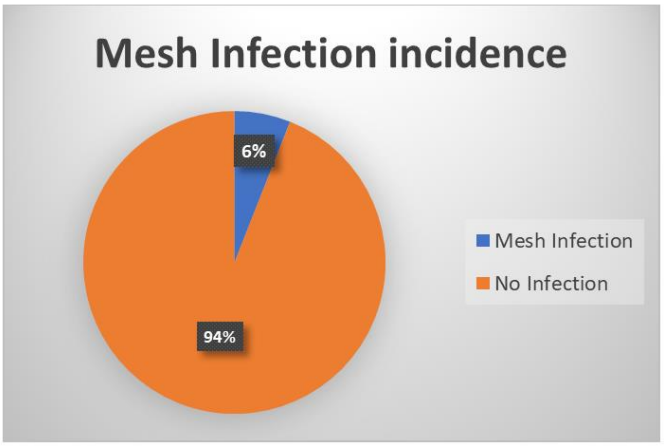

Figure 1: Mesh Infection cases among all hernia repair cases (n=400)

Among the total 400 mesh repair cases, 3% (n=24) of the participants had developed mesh infection after their hernia repair surgery.

Table 2: Gender Distribution of Infected participants (n=24)

Infected gender ratio	Frequency	Percentage
Male	22	91.7%
Female	2	8.3%

Among the 12 mesh infection cases, 91.7% were male and only 8.3% were female. The male: female ratio was 11:1.

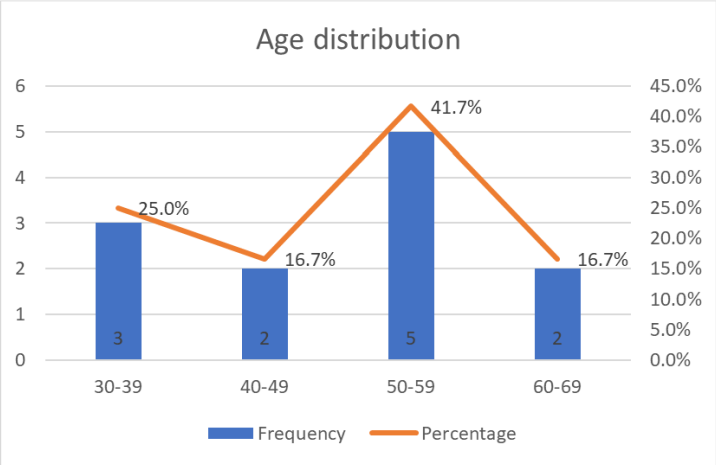

Figure 2: Age distribution of the participants (n=24)

Among the study participants, the age of the participant ranged from 32-68 years. Majority of the participants (41.7%), were from the age group of 50-59 years. 25% were from the age group of 30-39 years, 16.7% were between the age of 40-49 years, and another 16.7% were 60 years or older. The Mean ± SD age of the participants was 52.6 ± 1.7 years.

Table 3: Clinical Presentations among the participants (n=24)

Presentation	Frequency	Percentage
Chronic Pain	22	91.7%
Itchiness	8	33.3%
Swelling and redness	4	16.7%

Almost all (22/24) participants had chronic pain after their hernia repair. 33.3% had itchiness and irritation at the location of their surgery, and 16.7% had swelling and redness at mesh insertion site.

Table 4: Type of mesh used for initial hernia repair (n=24)

Initial Mesh type	Frequency	Percentage
Polypropylene Mesh	18	75.0%
Polypropylene & Polyglactin mesh	6	25.0%

For 75% of the participants, only polypropylene mesh was used during surgery. The remaining 25% had polypropylene & polyglactin mesh used during their initial hernia repair.

Table 5: Post-operative complications among the participants (n=24)

Post-Operative Complications	Frequency	Percentage
Surgical Site Infection	18	75.0%
Persistent Groin Pain	10	41.7%
Recurrent hernia	4	16.7%
Mesh Migration	2	8.3%

During the post-operative period and follow ups, 75.0% had surgical site infection, 41.7% had persistent groin pain, 16.7% had recurrent hernia, and 8.3% had mesh migration.

Table 6: Bacteriological findings of the participants (n=24)

Bacteriological findings	Frequency	Percentage
Staphylococcus Aureus	18	75.0%
E-coli	2	8.3%
No bacteria	4	16.6%

Among the participants, 16.6% had no bacterial infection. 75% had staphylococcus aureus, while 2 participants (8.3%) had E-coli.

DISCUSSION

Presently, hernia repair is a relatively common surgical procedure. In open hernia repair, a small incision is made in the groin region or in the abdominal

wall, depending on the location of the hernia, and the bulging intestines or omentum is identified. Then the herniated omentum or intestines are pushed back, and the wall is strengthened by stitching or by using a synthetic mesh. But despite many advances over the last 50 years, effective hernia repair is still considered a difficult task [15]. There is no gold standard when it comes to the method of hernia repair, and the decision largely depends on variables like tradition, context, severity and the familiarity of the surgeon on that method. Even after successful hernia repair, hernia recurrence can occur for many reasons over a long period of time [16]. Using prosthetic mesh instead of stitching can greatly reduce the recurrence rate of hernia [17]. But mesh implantation carries with it various possible risks as well. The present study was conducted to observe the factors and commonalities among patients who had mesh infection after their open inguinal hernia repair. For the initial selection of the participants, all 400 open inguinal hernia repair cases were included. As this was a retrospective study, the collection of data centered on hospital records and follow up interviews. Among the 400 hernia repair cases, 3% (n=24) of the participants had mesh infection, who were the main study sample. Among the initial hernia repair cases, 92% were male and 8% were female. This was similar to various other studies, as hernia occurs more commonly among the male population [18-20]. Among the 24 infected case, the male: female ratio was 22:2, which was also similar to other studies [21]. This is primarily due to the overall male prevalence among hernia cases. Among the participants, majority were 50-59 years, while the second highest prevalence was observed in the age group of 30-39 years. This as mainly because most of the initial hernia cases were from the older population and the youngest age group are more likely to have post-operative complications due to their active lifestyle. The Mean ± SD age of the participants was 52.6 ± 1.7 years, which was pretty similar to the findings of a Korean study [22]. Almost all the participants (91.7%) had chronic pain after their surgery, 33.3% had itchiness and irritation in the surgery region, and 4 patients had swelling and redness accompanied by pain. All 24 patients had multiple follow-ups for these problems. 75% of the participant's polypropylene mesh used at their initial surgery, while 25% had polypropylene & polyglactin mesh used during the initial surgery. The high prevalence of polypropylene mesh used for the surgery was similar to another 2011 study [23]. During the follow ups, multiple complications were present among the participants. All 24 patients had mesh infection, while 75.0% had surgical site infection, 41.7% had persistent groin pain, 16.7% recurrent hernia, while for 4 patients the mesh initially used had migrated to another region. Chronic groin pain is a pretty common complication after mesh repair of inguinal hernia [24]. Mesh migration, though rare, has prevalence all over the world and can cause complications ranging from severe discomfort to bladder malignancy [25-27]. Mesh migration is not limited to open hernia repair, and can also occur in laparoscopic repair as well [28]. Secondary surgery was necessary for all the participants, and the removal of mesh was necessary for the mesh migration case. The secondary surgery was done by stitching the wall for this particular case. Bacteriological findings show us among the 24 mesh infected patients, 16.6% had no bacterial infection. 75.0% had staphylococcus aureus, while 4 patients had E-coli. This high prevalence of staphylococcus aureus among the participants was similar to the findings of another study [22].

Limitations of the Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

The use of mesh for inguinal hernia repair is a result of medical advancement for many years. But complications are still relatively common after a successful inguinal hernia repair. The incidence of mesh infection among all hernia repair cases of this study was 3%. The most common clinical presentation was chronic pain, and surgical site infection had high prevalence among the mesh infection cases. Mesh migration was solved by removal of the mesh and hernia repair by stitching the abdominal wall. Staphylococcus aureus had the highest prevalence among the bacterial infection cases.

FUNDING

No funding sources.

CONFLICT OF INTEREST

None declared.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

REFERENCES

1. Inguinal hernia: Types, symptoms, diagnosis & treatments [Internet]. Cleveland Clinic. [cited 2022Jan2]. Available from: https://my.clevelandclinic.org/health/diseases/16266-inguinal-hernia
2. Jenkins, J. T., & O'dwyer, P. J. (2008). Inguinal hernias. *Bmj*, 336(7638), 269-72.
3. Inguinal hernia: Symptoms, causes, diagnosis, & treatment [Internet]. WebMD. WebMD; [cited 2022Jan3]. Available from: https://www.webmd.com/digestive-disorders/inguinal-hernia
4. Awad, S. S., & Fagan, S. P. (2004). Current approaches to inguinal hernia repair. *The American journal of surgery*, 188(6), 9-16.

5. Bassini, E., Brown, R. K., Galletti, G., & Tumm, K. S. (1966). New technique for the cure of inguinal hernia. *Journal of the History of Medicine and Allied Sciences*, 401-7.
6. Ferguson, D. J., & Varco, R. L. (1957). Teaching hernia repair by McVay technique. *Minnesota medicine*, 40(1), 12.
7. Shearburn, E. W., & Myers, R. N. (1969). Shouldice repair for inguinal hernia. *Surgery*, 66(2), 457-9.
8. Glassow, F. (1976). Inguinal hernia repair: a comparison of the Shouldice and Cooper ligament repair of the posterior inguinal wall. *The American Journal of Surgery*, 131(3), 306-11.
9. Shouldice, E. B. (20030. The Shouldice repair for groin hernias. *Surgical Clinics*, 83(5), 1163-87.
10. McCormack, K., Scott, N., Go, P. M., Ross, S. J., & Grant, A. (2003). Laparoscopic techniques versus open techniques for inguinal hernia repair. *Cochrane database of systematic reviews*, 1.
11. Amid, P. K., & Shulman, A. G. (1996). Open" tension-free" repair of inguinal hernias: the Lichtenstein technique. *European Journal of Surgery*, 162(6), 447-53.
12. Kark, A. E., Kurzer, M. N., & Belsham, P. A. (1998). Three thousand one hundred seventy-five primary inguinal hernia repairs: advantages of ambulatory open mesh repair using local anesthesia. *Journal of the American College of Surgeons*, 186(4), 447-55.
13. Falagas, M. E., & Kasiakou, S. K. (2005). Mesh-related infections after hernia repair surgery. *Clinical microbiology and infection*, 11(1), 3-8.
14. Hernia mesh infection: Symptoms, causes, treatment and litigation [Internet]. Drugwatch.com. [cited 2022Jan4]. Available from: https://www.drugwatch.com/hernia-mesh/complications/infection/
15. Bringman, S., Conze, J., Cuccurullo, D., Deprest, J., Junge, K., Klosterhalfen, B., ... & Schumpelick, V. (2010). Hernia repair: the search for ideal meshes. *Hernia*, *14*(1), 81-87.
16. Hesselink, V. J., Luijendijk, R. W., De Wilt, J. H., Heide, R., & Jeekel, J. (1993). An evaluation of risk factors in incisional hernia recurrence. *Surgery, gynecology & obstetrics*, *176*(3), 228-234.
17. Ponsky, T. A., Nalugo, M., & Ostlie, D. J. (2014). Pediatric laparoscopic inguinal hernia repair: a review of the current evidence. *Journal of Laparoendoscopic & Advanced Surgical Techniques*, *24*(3), 183-187.
18. Burcharth, J., Pedersen, M., Bisgaard, T., Pedersen, C., & Rosenberg, J. (2013). Nationwide prevalence of groin hernia repair. *PloS one*, *8*(1), e54367.
19. Lu, A., & Burstein, J. (2012). Paraperitoneal inguinal hernia of ureter. *Journal of Radiology Case Reports*, *6*(8), 22.
20. Wang, K., Tan, S. S., Xiao, Y., Wang, Z., Peng, C., Pang, W., ... & Chen, Y. (2021). Characteristics and treatments for pediatric ordinary and incarcerated inguinal hernia based on gender: 12-year experiences from a single center. *BMC surgery*, *21*(1), 1-7.
21. Primatesta, P., & Goldacre, M. J. (1996). Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. *International journal of epidemiology*, *25*(4), 835-839.
22. Akyol, C., Kocaay, F., Orozakunov, E., Genc, V., Bayram, I. K., Cakmak, A., ... & Kuterdem, E. (2013). Outcome of the patients with chronic mesh infection following open inguinal hernia repair. *Journal of the Korean Surgical Society*, *84*(5), 287-291.
23. Deeken, C. R., Abdo, M. S., Frisella, M. M., & Matthews, B. D. (2011). Physicomechanical evaluation of polypropylene, polyester, and polytetrafluoroethylene meshes for inguinal hernia repair. *Journal of the American College of Surgeons*, *212*(1), 68-79.
24. Olsson, A., Sandblom, G., Fränneby, U., Sondén, A., Gunnarsson, U., & Dahlstrand, U. (2017). Impact of postoperative complications on the risk for chronic groin pain after open inguinal hernia repair. *Surgery*, *161*(2), 509-516.
25. Agrawal, A., & Avill, R. (2006). Mesh migration following repair of inguinal hernia: a case report and review of literature. *Hernia*, *10*(1), 79-82.
26. Novaretti, J. P. T., Silva, R. D. P., Cotrim, C. A. C., & Souto, L. R. M. (2012). Migration mesh mimicking bladder malignancy after open inguinal hernia repair. *Hernia*, *16*(4), 467-470.
27. Jeans, S., Williams, G. L., & Stephenson, B. M. (2007). Migration after open mesh plug inguinal hernioplasty: a review of the literature. *The American surgeon*, *73*(3), 207-209.
28. HUME, R. H., & BOUR, J. (1996). Mesh migration following laparoscopic inguinal hernia repair. *Journal of laparoendoscopic surgery*, *6*(5), 333-335.