ORIGINAL ARTICLE

PREVENTION OF SEROMA FORMATION AFTER OPEN VENTRAL HERNIA REPAIR WITH MASSIVE SKIN AND SUBCUTANEOUS RECONSTRUCTION: A RANDOMIZED CLINICAL TRIAL

Osama M. H. Khalil, Wael M. Abdalla, Zaki A. Allam, Osama A. Eltih
Department of Surgery, Faculty of Medicine, Zagazig University, Egypt

Correspondence to: Osama M. H. Khalil, Email: osama100khalil@yahoo.com

Abstract

Introduction: Seroma and wound breakdown are commonest post-operative complication after open ventral hernia repair with massive skin and subcutaneous reconstruction. Following open ventral hernia, these occur in 12-20% and increase to 17-34% when combined with massive skin and subcutaneous reconstruction. This study evaluates a novel technique of applying talc powder to subcutaneous flaps to prevent seroma formation.

Patients and Methods: Sixty one patients of ventral hernia with skin and subcutaneous reconstruction were admitted to surgery department in Zagazig University Hospital. They were randomly divided into two groups .The PRE group did not receive talc therapy, and the POST group received talc therapy in the subcutaneous dissection. A prospectively collected surgical outcomes database was accessed identifying all patients. Demographics, peri-operative data, and outcomes were analyzed.

Results: PRE group consisted of 31 patients and POST group consisted of 30 patients. Complication rates for PRE / POST goups were: cellulitis or oral antibiotics 35.5%-13.3%, intravenous antibiotics 9.7%-3.3%, operative / radiologic intervention for wound infection 19.4%-13.3%, seroma intervention 19.4%-3.3%, wound breakdown12.9%- 3.3% and hernia recurrence 9.7 %- 0%. Of these, seroma intervention and hernia recurrence were significantly decreased in the POST group (p0.013, p0.032). Mean drain duration was 27.4 days for PRE and 16.3 days for POST (p0.004). Mean follow-up was 5.6 months for PRE and 2.5 months for POST (p0.032).

Conclusion: The addition of talc powder made a dramatic difference in patient outcomes. We found a decreased percentage of wound complications, with a significant reduction in seroma formation, recurrence, and drain duration. The use of talc powder is simple and easy for high risk patients to avoid post-operative complications especially seroma and wound break.

Keywords: seroma, ventral hernia, Talc powder.

INTRODUCTION

Hernioplasty with prosthetic mesh is currently the treatment of choice for ventral hernia, with lower recurrence rates than classical herniorrhaphies. Nevertheless, the use of prosthetic meshes is associated with postoperative complications such as increased rates of seroma and hematoma formation, chronic

inflammation, infection, chronic pain and mesh migration.[1]

A seroma is defined as a clinically identifiable collection of serous fluid in any tissue, potential space, or cavity after an operation. Seroma etiology remains unknown, but it seems to be due to a local inflammatory response to a mechanical injury incurred by tissue aggression during surgery and the presence of foreign bodies.[2]

The use of drainages does not decrease the frequency of seroma formation,[3] and a direct relationship exists between the amount of mesh in contact with subcutaneous tissue and the incidence of seroma.[4]

When seroma becomes symptomatic, percutaneous or surgical drainage is required and this procedure is associated with high risk of infection. When a seroma persists despite successive drainages, it becomes a difficult to solve problem and an important impairment to the patient's quality of life.

Talcum powder was first used in 1935 to produce pleurodesis before carrying out a lobectomy. After this report, intrapleural talcum powder application has been demonstrated to be one of the most effective, simplest, and with the highest cost-benefit ratio, procedures for the treatment of recurrent pleural effusions. Talcum powder induces a strong fibrotic reaction in the pleural cavity due to the activation of polymorphonuclear neutrophils, interleukin 8 and fibroblast growth factor.[5] Complications related to talcum powder pleurodesis are not frequent; the most common adverse effect is pyrexia secondary to the inflammatory process, and major systemic complications are exceptional.

MATERIAL AND METHODS

The study was conducted in gastrointestinal unit of surgery department of Zagazig University Hospital. Ethic approval was granted by the institutional ethics committee. The study was designed as randomized trial.

Sixty one adult patients seen in the surgical outpatient clinic with ventral hernias were scheduled for elective on-lay prolene mesh repair. Informed consent was obtained from all eligible patients. Patients with complicated hernias and immuno-compromised patients were excluded. The data were collected prospectively identifying all patients undergoing these operations.

Patients were divided into two groups based on receiving talc therapy. The PRE group (31 patients) did not receive talc therapy, and the POST group (30 patients) did receive talc therapy in the subcutaneous dissection (Fig. 1). Patient demographics, peri-operative data, and outcomes were analyzed using standard statistical methods. Patient demographic and peri-operative data, including patient age, comorbidities, the type and extent of subcutaneous procedures, size of hernias, operative time, and others factors were collected. We performed a study evaluating a novel intra-operative technique of applying talc to the subcutaneous flaps created during panniculetomies, tummy tucks and hernia repair to prevent seroma formation. Following the operative dissection and otherwise completion of the operation except for wound closure, talc is sprayed into the wound in volumes from 4 grams to 8 grams (Fig. 2).

Fig 1. Subcutaneous dissection.

Fig 2. Talc powder application.

Surgical treatment of very large ventral hernias with concomitant panniculectomies or massive subcutaneous dissection were performed. The typical operation included a wide skin and subcutaneous incision with significant subcutaneous dissection with and without skin resection. The ventral abdomen was entered, and the intestinal content of the hernia were reduced back into the abdomen. The hernia was repaired with on-lay prolene mesh which was fixed by (2/0 prolene sutures)

(Fig. 3). The subcutaneous tissues were irrigated and either closed or talc was sprayed or instilled in the wound prior to closure.

Fig 3. Application of prolene mesh.

Closure of the abdomen (Fig. 4) was performed in the same manner in all patients regarding the sutures used and drains placed. Tow limbs suction drain were placed through the skin and into the subcutaneous space. It was left in place until less than 30 cc of fluid was drained over 24 hours. When the drain collected less than 30 cc of fluid, the drain was removed.

Fig 4. Wound closure.

Descriptive studies were performed with SPSS version 11.5.and group characteristics were compared using Student t test (Table 1). The nonparametric Mann–Whitney U test was used to assess the statistical significances of the differences between the 2 groups.

Chisquare and Fisher exact tests were applied to analyze categorical variables. Continuous variables are presented as the median (interquartile range); categorical variables are presented as incidences and percentages. Statistical significance was evaluated at the conventional α=.05 level.

RESULTS

From June 2011 to September 2013, a total of 61 patients underwent ventral hernia repair with skin and subcutaneous reconstruction were randomly divided into two groups. The PRE group did not receive talc therapy, and the POST group received talc therapy in the subcutaneous dissection.

(Table 1) describe the demographic data and comorbidities of the patients included in the analysis.

Outcomes data are shown in (Table 2). The laparotomy size in the pre group was (16±7 cm) while, in post group was (15±6 cm) without any significant effect on the incidence of post-operative seroma incidence. All cases needed post-operative suction drain, which left in place until less than 30 cc of fluid was drained over 24 hours. The post group shows significant decrease in suction drain duration (16.3days) in comparison to pre group (27.4days). On pain assessment of both group, the post group showed high pain scale (8.1) with prolonged duration of analgesic therapy (5.2±2.6 days) in comparison to pre group (6.6) & (4.8±1.5) most probably due to local subcutaneous inflammation in the post group , but it was not significant especially with regular post-operative analgesic. Regarding post-operative complications, the pre group showed significant incidence of post-operative of seroma, cellulitis and hernia recurrence, while the post group showed limited post-operative complication.

The pre group needed significant intervention for collected seroma in the form of repeated aspiration or even surgical drainage under cover of oral antibiotic which was limited in post group. Other complications like wound infection and breakdown showed insignificant difference between both groups. Although both group were similar in post-operative I.V antibiotic and hospital stay duration but the pre group showed prolonged postoperative mean of follow up(5.6 months) in comparison of post group (2.5 months).

Table1. Demographic and comorbidities.

Characteristics	Pre group(31)	Post group(30)	P value
Sex, No (%) Women	24 (77.4%)	25 (83.4%)	
Men	7 (22.6%)	5 (16.6%)	0.13
Age, mean(range)	49.8 (18-63)	47.1 (21-68)	0.45
BMI, mean (range)	36 (17-65)	37 (24-82)	0.4
Wall defect size(cm)	12.6±9.2	11.4±9.7	0.45
Incarcerated hernia	7 (22.6%)	10 (33.3%)	0. 6
Diabetes mellitus	8 (25.8%)	7 (23.4%)	0.6
Pulmonary disease	4 (12.9%)	3 (10%)	0.62
Operative time(min)	105±27	106±24	0.4

Demographic characteristics (including sex, age, body mass index (BMI), wall defect size, comorbidities and operative time) are summarized in (Table 1).

Table 2. Outcomes of the study.

	Pre group	Post group	P value
Laparotomy size (cm)	16 ±7	15±6	0.4
Duration of drain (days)	27.4	16.3	0.004*
Post-operative pain (vas pains scale)	6.6	8.1	0.45
Analgesic therapy (days)	4.8±1.5	5.2±2.6	0.61
Hematoma	2 (6.45%)	1 (3.3%)	0.62
Seroma	10 (32.3%)	2 (6.67%)	0.012*
Cellulitis or oral antibiotics	11 (35.5%)	4 (13.3%)	0.031*
Intravenous antibiotics	3 (9.7%)	1 (3.3%)	0.35
Intervention for wound infection	6 (19.4%)	4 (13.3%)	0.43
Wound breakdown	4 (12.9%)	1 (3.3%)	0.45
Seroma intervention	6 (19.4%)	1 (3.3%)	0.013*
Hernia recurrence	3 (9.7%)	0 (0%)	0.032*
Hospital stay(days)	5.6±1.2	5.1±1.2	0.4
Mean follow-up (months)	5.6	2.5	0.032*

DISCUSSION

Seroma is a frequent complication after open repair of hernia, with a variable incidence reported by different groups due to it being underreported. Most seromas are asymptomatic and inconspicuous on inspection, and diagnosis is based on the clinical finding of a palpable fluid collection in the subcutaneous tissue.[6]

Most seromas resolve spontaneously without any intervention. Fabozzi et al.[7] suggest that a seroma should be considered a complication only if it persisted for more than six weeks, presents continuous growth, or becomes symptomatic. If an underlying complication is suspected, such as infection or recurrence, then ultrasonography is the initial technique to confirm the nature of the swelling.[8]

Nowadays there is no consensus on the management of symptomatic seroma: it varies from percutaneous aspiration to surgical drainage or the instillation of sclerosing substances.[6]

Percutaneous seroma aspiration is the most widely used technique for symptomatic seroma management. This technique of repeated needle aspiration and mild application of external pressure was first described in 1971,[9] but it is associated with a higher risk of seroma

infection and a high recurrence rate.[10,11]

A more aggressive 3-trocar laparoscopic approach was described by Lehr and Schuricht[12] for treatment of persistent seromas after post incisional hernia repair. The technique described consists of evacuating both the serous fluid and the fibrinous debris followed by argon beam scarification of the seroma cavity lining. When seroma develops a thick surrounding capsule then it is considered a cystic seroma, and capsule removal might be the only curative option.[13]

In our study, the demographic and preoperative data of both pre group and post group were similar without any significant difference. This was the same of the study groups of Rita et al.[14]

In the ventral hernia the incidence of fluid collections following surgery has been reported at between 0 and 17%.[15] They are usually the result of surgical trauma or accumulation of fluid in the empty hernial sac and generally do not require treatment, unless they give rise to symptoms or persist for more than 6–8 weeks, in which case drainage is necessary.[16] The previous study is matching our results although; there were significant decrease in the incidence of seroma among post group patients whom received talc powder (6.67%) (p=0.012).

The post group patients show significant decrease in duration of post-operative wound drain (16.3 days)in comparison to pre group (27.4days) (p=0.004) as we used it to evaluate usage of talc powder to reduce post-operative seroma formation and need to post-operative drain which was denied by Willy et al.[17] Our results are matching Rita et al[14] series as they used post-operative drain as a rule in their procedure and nearly for same duration.

As stated by Fabozzi et al[7] in their study regarding seroma management, we managed our complicated cases but there was significant decrease in seroma intervention of post group in comparison to pre group.

Although we used IV antibiotic as prophylactic treatment of wound infection in our study following the study of Aufenacker et al[18] but the rate of post-operative wound infection is still high in our series (13.3-35.5%) in relation of series of other studies like Finan et al[19] and Taylor et al[20] which vary from(1-10%). This is explaining use of oral antibiotic in infected cases with significant decrease in post group in relation to pre group.

The hernia recurrence in post group was absent while in pre group the recurrence rate was 9.7%. This shows the significant role of talc powder in hernia recurrence reduction which is matching the studies of Rita et al[14] and Shell et al.[21]

We observed no significant difference between both groups regarding other postoperative complications like (pain, hematoma and wound break) which was reflected on patients need to analgesia and duration of hospital stay. Although of previous observation the post group appreciated short duration of post-operative follow up which was significantly prolonged in pre group , most probably related to use talc powder but it was within normal range of post-operative follow up for such cases according to study of Rita et al.[14]

In conclusion many studies had been done to evaluate use of talc powder in surgery especially treatment of malignant pleural effusion and treatment of postoperative seroma. Our study concentrates on use of talc powder in prophylaxis of postoperative seroma formation after ventral hernia repair and massive skin reconstruction. We found a decreased percentage of wound complications, with a significant reduction in seroma formation, recurrence, and drain duration. This suggests talc will provide a mean to decrease wound complications in massive ventral hernias.

REFERENCES

1. Stephenson BM. Complications of open groin hernia repairs. Surg Clin North Am. 2003;83:1255–78.
2. Bendavid R, Kux M. Seromas. In Abdominal Wall Hernias: Principles and Management. Edited by Bendavid R, Abrahamson J, Arregui ME, Flament JB, Phillips EH. New York: Springer. 2001:753–6.
3. De Vires Reilingh TS, Van Geldere D, Langenhorst BLAM, et al. Repair of large midline incisional hernias with polypropylene mesh: comparison of three operative techniques. Hernia. 2004;8:56–90.
4. Ogunbiyi SO, Morris-Stiff G, Sheridan WG. Giant mature cyst formation following mesh repair of hernias: an underreported complication. Hernia. 2004;8:166–8.
5. Antony VB, Nasreen N, Mohammed KA, et al. Talc pleurodesis. Basic fibroblast growth factor mediates pleural fibrosis. Chest. 2004;126:1522–8.
6. Javier L, Miguel AG, Luis A, Daniel A and Carmen J. Persistent inguinal seroma managed with sprinkling of talcum powder: a case report. Journal of Medical Case Reports. 2012;6:391.
7. Fabozzi M, Allieta R, Grimaldi L, et al: Open vs laparoscopic repair of abdominal hernia: a case control study in over 60 years old patients. BMC Surgery. 2013;13:A19 doi:10.1186/1471-2482-13-S1-A19.
8. Susmallian S, Gewurtz G, Ezri T, et al. Seroma after laparoscopic repair of hernia with PTFE patch: is it really a complication? Hernia. 2001;5:139–41.

9. Smith RS. The use of prosthetic materials in the repair of hernias. Surg Cl North Am. 1971;51:1387–99.

10. Rana KV, Singh G, Deshpande AN, et al. Postoperative complications of mesh hernioplasty for incisional hernia repair and factors affecting the occurrence of complications. 2013;6:25-31.

11. Tsimoyiannis EC, Siakas P, Glantzounis G, et al. Seroma in laparoscopi ventral hernioplasty. Surg Laparosc Endosc. 2001;11:317–21.

12. Lehr SC, Schuricht AL. A minimally invasive approach for treating postoperative seromas after incisional hernia repair. JSLS. 2001;5:267–71.

13. Maygoitia JC, Almaraz A, Diaz C: Two cases of cystic seroma following mesh incisional hernia repair. Hernia. 2006;10:83–6.

14. Rita AB, Ajita P, Stanley G, et al. Subcutaneous talc and thrombin decrease seroma rates and drain duration after open ventral hernia repair with massive skin and subcutaneous reconstruction. Journal of the American College of Surgeons. 2010;211:s89.

15. A Parra, S Revuelta, T gallego, et al: Prosthetic mesh used for inguinal and ventral hernia repair normal appearance and complications in ultrasound and CT. The British Journal of Radiology. 2004;77:261–5.

16. Panse M, Deshpande N, Mandhane A, BhaleraoP: Seroma prevention technique following endoscopic direct inguinal hernia repair. 2013;2:4928-32.

17. Willy C, Sterk J, Gerngross H, Schmidt R. Drainage in soft tissue surgery. What is evidence based? Chirurg. 2003;74:108-11.

18. Aufenacker TJ, van Geldere D, van Mesdag et al. The role of antibiotic prophylaxis in prevention of wound infection after Lichtenstein open mesh repair of primary inguinal hernia: a multicenter double-blind randomized controlled trial. Ann Surg. 2004;240:955-60.

19. Finan KR, Vick CC, Kiefe CI, et al. Predictors of wound infection in ventral hernia repair. Am J Surg. 2005;190:676-81.

20. Taylor EW, Duffy K, Lee K, Hill R, et al. Surgical site infection after groin hernia repair. Br J Surg. 2004;91:105-11.

21. Shell, D.H. 4th, de la Torre, J., Andrades, P., & Vasconez, L.O.: Open repair of ventral incisional hernias. Surgical Clinics of North America. 2008;88:61-83.