E-ISSN: 2616-3470
P-ISSN: 2616-3462

www.surgeryscience.com
2019; 3(2): 70-72
Received: 10-02-2019
Accepted: 12-03-2019

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Surgical site ınfection following ventral hernia repair: Evaluation of different prosthetic materials' ımpact

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DOI: https://doi.org/10.33545/surgery.2019.v3.i2b.15

Abstract
Introduction: Regulations of antisepsis were described by Joseph Lister in 1867; however, surgical site infection is still a common problem in surgical patients despite of the developments in medicine. It is estimated that 5% of 30 million surgeries performed each year are complicated with SSI. In this study we investigated the wound infection rates for 3 different surgical approach for ventral hernias.
Patients and Methods: This was a clinical study done in the department of surgery in a tertiary care hospital. A total of 54 patients included the study. Patients who underwent hernia repair with dual mesh formed the DM group(17 patients), who underwent repair by primary suturation formed RPS group (RPS:16 patients), whereas those who underwent repair with prolene mesh placement formed the PMR (PMR:21 patients) groups.
Results: In PMR group 4 patient out of 21 developed wound infection, and in RPS group 1 out of 16 patients, in DM group no patient developed wound infection with a p-value of 0.032 which is statistically significant.
Discussion: It is very important to reduce aggressive dissection, prevent seroma formation and use of optimal prosthetic alternative. In this study the data showed that, ventral herniorraphy with prolene mesh carries higher risk of wound infection tha using dual mesh.

Keywords: surgical site infection, herniorraphy

Introduction
Regulations of antisepsis were described by Joseph Lister in 1867; however, surgical site infection (SSI) is still a common problem in surgical patients despite of the developments in medicine [1]. It is estimated that 5% of 30 million surgeries performed each year are complicated with SSI [1, 2]. Although overall SSI risk is low, SSI is the most common nosocomial infection with the percentage of 38% [1, 3]. Centers for Disease Control and Prevention defined SSI as infection related to an operation that occurs at the surgical incision within 30 days after surgery, or within 90 days if prosthetic material implanted [1, 4]. SSI is classified as either incisional (involvement of skin only, or subcutaneous tissues with skin), or organ-space (any part of the body other than incision site layers, that involved in the operation) according to the National Nosocomial Infection Surveillance System criteria [1, 5]. Of all SSI's, nearly two-thirds are incisional, and one-third are organ-space. In this study we investigated the wound infection rates for 3 different surgical approach for ventral hernias.

Patients and Methods
This was a clinical study done in the department of surgery in a tertiary care hospital. A total of 54 patients included the study. The study was approved by the Institutional Ethical Committee. All the patients who attended surgical outpatient department with ventral hernia (VH) (umbilical, paraumbilical, incisional hernias) were enrolled in our study. Patients with obstructed or strangulated VH, Patients with abdominal malignancies, Patients with coagulopathy, severe cardiopulmonary disease, ascites and renal failure, Patients who had VH repair in combination with another major surgical operation such as laparoscopic cholecystectomy and inguinal hernia repair excluded from study.All patients operated by same surgical team. All cases were done under general anaesthesia. Antibiotic was prophylactically given before incision and two doses given postoperatively. Urinary bladder catheterization is done in all groups. The surgical technique was chosen on a patient-by-patient basis using the surgeons' judgment. Factors that influenced the decision consisted of age, complex hernia

conditions, diameter of hernial sac and body mass index etc. The RPS technique consisted of a primary repair with interrupted non-absorbable sutures. In the PMR technique, the prolene mesh (polymesh polypropylene®, Betatech Medical, Istanbul / Turkey) was placed anterior to the rectus fascia after supporting the fascia with non-absorbable sutures. It consisted of a wide dissection of subcutaneous tissue to allow a mesh overlap of 3 cm beyond the outer border of the fascial defect. The mesh was fixed using interrupted long-term absorbable sutures at 1-cm intervals. With the same approach, in DM group the dual-sided mesh (polymesh dual®, Betatech Medical,Istanbul/Turkey) replaced tension-free with long-time absorbale stitches. Drains were placed after any repair of a defect that required extended subcutaneous tissue dissection that resulted in bleeding or creation of a dead space.

Patients who underwent hernia repair with dual mesh formed the DM group (17 patients), who underwent repair by primary suturation formed RPS group (RPS:16 patients), whereas those who underwent repair with prolene mesh placement formed the PMR (PMR:21 patients) groups.

Intraoperative - post operative complications, wound complications, wound infection parameters evaluated.For categorical data, either the chi-square or Fisher's exact test was used. For continuous parametric variables, either a 2-sided *t* test, Mann-Whitney test, or ANOVA was used. Results are reported as mean ± SEM, and a $P<0.05$ was deemed significant.

Results

No significant difference existed in sex, age, or BMI between the 3 groups. Previous abdominal operations were present in 5 patients in the DM group, in 4 patients in the RPS group, and in 8 patients in the PMR group (*P*=NS). No patients had previous ventral hernia repairs in the RPS group. Previous ventral hernia repairs had been performed in 6 and 4 patients in the The identification of a previously undiagnosed second ventral hernia defect in 1 patients in DM group, 4 patients in PMR group and 4 patients in RPS group. No difference existed in OT times between all groups and mean operation time was(71 min 25+/-105). No intraoperative complications occurred in any of the patients.

Both the groups did not have any intraoperative complications. In the postoperative period in the DM group, no patient developed wound haematoma and seroma. In RPS group 1 out of 16 patients developed wound hematoma with a p-value of 0.168 and 7 out of 21 patients developed seroma in group PMR with a p- value of 0.004 which were statistically significant. In PMR group 4 patient out of 21 developed wound infection, and in RPS group 1 out of 16 patients, in DM group no patient developed wound infection with a p-value of 0.032 which is statistically significant.

Discussion

SSI is the most common nosocomial infection among surgical patients, and it is associated with increased risk of morbidity and mortality. Additionally, health-care costs are adversely influenced by the worse outcomes related to SSI. There is a complex interaction of patient, procedure, and surgeon related risk factors in the SSI etiology. However, it is not always possible to eliminate all risk factors [1]. One of the most definive risk factors is prosthetic material in the wound. That can be demonstrated by mesh repair for hernias.

Although many specialties have described reductions in SSI rates among ventral hernia repair (VHR) cases [6], SSI remains prevalent. This may be attributable to multiple barriers specific to VHR. Evidence-based interventions that improve long-term outcomes may worsen short-term results. For example, although mesh reinforcement decreases hernia recurrence, it also increases the risk of SSI [6,7 6 nın 4]. In addition, until recently, there have been no widely endorsed guidelines for standardizing care of ventral hernias. Furthermore, because of the prevalence of the disease, limiting care to specialty centers can be challenging, with the limited capacity of specialists and the reluctance of general surgeons to lose case volume and hernia-related operative skills. Finally, specialists in VHR may not easily demonstrate better outcomes because of patient and disease heterogeneity. By tackling more challenging patients and cases, specialists may paradoxically experience
higher rates of complications [6].

Permanent synthetic meshes have been used in clean wounds with low infectious complications and excellent long-term results with low recurrence rates (8, 9.10.11, 8 ve 8 in1-3) Synthetic meshes are nonabsorbable meshes made of polypropylene (PP), expanded polytetrafluoroethylene, polyester, lightweight PP, or a combination of these materials used to obtain a ‘‘tension-free’’ closure in ventral hernia repairs.However, surgeons are reluctant to implant a permanent foreign
material in a patient undergoing a contaminated ventral hernia repair because of the increased risk of postoperative infection, bowel adhesion, mesh extrusion, mesh erosion, fistula formation, seroma development, and pain [8] The most appropriate mesh for hernia repair in clean-contaminated and contaminated wounds is not as clear. Current options have included staged repairs, primary fascial closure, or reinforcement with biologic mesh. In this study we prefer primary fascial closure if it is possible.

The issues of mesh infection after ventral hernia repair and chronic mesh exposure are not emphasized enough. Many patients encounter these problems, and despite wound dressing treatment by the primary surgeon, their infections are still not controlled. These patients then seek further treatment at other hospitals; therefore, the incidence of mesh infection may be higher than is reported [12]. In our study, we described some of our experience with this issue. As, none of further treatment methods are perfect; therefore, preventing mesh infection is of primary importance. Because of this matter it is very important to reduce aggressive dissection, prevent seroma formation and use of optimal prosthetic alternative. In this study the data showed that, ventral herniorraphy with prolene mesh carries higher risk of wound infection tha using dual mesh.

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