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A Prospective Study of a Cost-Effective Method for Prevention of Incisional Hernia in Subcostal and Lumbar Incisions by Use of Nylon Loop, Intermittent Mass Closure

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Abstract

Background and Objective: Occurrence of incisional hernia in subcostal incisions (used mainly for open cholecystectomy and liver surgery) and lumbar incisions (used mainly for nephrectomy and pyelolithotomy) is relatively less travelled journey than midline incisional hernias. During my tenure here as an assistant professor, in 2 years, I saw many cases of weakness (flank bulge) due to damage to subcostal nerve, to pure hernias. All of us were using layered closure using vicryl 1 no. for these incisions as a standard method. post-operative infection was rare in these clean cases. I thought that layered closure must be the cause and mass closure could prevent this complication. *Methodology:* We decided to do a prospective study to know the fact. During next 5 years 50 patients were operated for different indications through these incisions, 20 through lumbar and 30 through subcostal incisions. All the incisions were closed by nylon 1 no. mass closure as described below. Patients were followed up in O.P.D. and by telephone. The results were noted. *Results:* No patient with mass closure technique developed weakness with mass closure during follow up. *Conclusion:* Mass closure, with non-absorbable suture, of subcostal and lumbar incisions as described below is a better method of closure than layered closure using delayed absorbable suture for prevention of post-operative hernias.

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Introduction

There is much literature available about midline incisional hernia but that developing from subcostal and lumbar incisions not much described. The rate of flank bulge formation after flank incision for nephrectomy for renal tumors had been substantially underreported in the previous literature. More recently, Dr. Paul Russo et al. reported that 1.8% to 4% patients who underwent supra-11th rib mini-flank incision had complications related to the operative site (i.e. herniation, flank bulge)[1]. Incidence varies from 3% to 49% [2]. Incisional hernias following subcostal incision for cholecystectomy occur due to damage to 8th , 9th and 10th intercostal nerves and from faulty closure of deeper layers in the lateral part of incision [2]. They are relatively uncommon but much difficult to treat and cause of morbidity. Flank approach can result in injury to the subcostal nerve with denervation and paresis of the flank musculature, leading to chronic postoperative pain or flank bulge in 3% to 49% of patients [3]. They may vary in size from a small apple to include entire suture line. Most postoperative incisional hernias occur in nephrectomy or aortic aneurysm repair incisions but have also been described following iliac bone graft harvest and latissimus dorsi myocutaneous flap [4]. Aetiology varies from technique used for closure of incision, level of experience of surgeon (more common if closure done by resident surgeon), postoperative infection (almost doubles risk) [2], postoperative cough, nutrition and immunity of the patient and age. Incisional hernia is a clinical diagnosis, which can be

confirmed by ultrasonography. Computed tomography scan is the diagnostic modality of choice and allows differentiating them from abdominal wall musculature denervation atrophy complicating flank incisions [5]. Although with the advent of laparoscopic cholecystectomy and nephrectomy need of open surgeries have reduced, in difficult surgeries and for complications during laparoscopy and for liver surgeries open surgery is mandatory. In our institution with scarce resources and inadequate training of surgeons in laparoscopy, open surgeries are frequent. We were trained for layered closure of these incisions using delayed absorbable suture. We noted relatively high incidence of incisional hernia in follow up.

Materials and Methods

During my tenure in surgery education I observed that many patients develop weakness or incisional hernia following subcostal and lumbar incisional surgeries. It was found that these patient wounds were closed by layered closure with absorbable suture. It was decided to shift from continuous layered closure to intermittent mass closure and from absorbable to non-absorbable suture as described below. This prospective study was carried out over a period of 5 years at our institute, S.B.K.S. M.I.R.C., Vadodara from october 2013 until now. Patients were followed up in O.P.D. and by telephonic talk. During follow-up it was observed that none of the patient with mass closure developed hernia.

Inclusion Criteria

All patients undergoing surgery through lumbar or subcostal incisions were included in study except contaminated cases.

Anatomy

Flank incision: At the posterior end of the incision latissimus dorsi, serratus posterior inferior and quadratus lumborum replace the external and internal oblique muscles of the more anterior incision all muscles are divided in line with the skin incision. The incision may be positioned to be subcostal, or over and in line with the 10th to 12th ribs. If the incision is subcostal posterior division of the renal fascia gives access to the retroperitoneal fat and the peritoneum is swept away anteriorly.

Subcostal incision: medially rectus abdominis and laterally external oblique, internal oblique and transversus abdominis from superficial to deep are cut.

Technique

All patients were operated under general anaesthesia. All the patients were given Inj. Cefuroxime 1.5 gm at the time of induction of anaesthesia and one more dose after 12 hours. A Ryle's tube and Foley's catheter is introduced in all patients after induction of anaesthesia. After performing appropriate surgery closure of incision begins. An nylon 1 no. loop is taken and one end of suture from needle is cut so that a long suture is gained at minimum cost. Needle is passed through all the cut muscles, (including peritoneum in subcostal incision) at one end of incision and after bringing the needle to surface ,same is passed through another end of incision including all the cut muscles . This suture is not tied but held with a mosquito forceps. Similarly 10-15 such stitches taken at 1 to 1.5cm interval without tying the knot. After all the sutures are in place they are tied one by one to close the incision. Subcutaneous tissue is sutured by polyglactin 3-0 and skin is sutured by nylon 3-0 (Figure 1, 2).

Fig. 1: Pre-operative images of lumbar incisional Hernia

Fig. 2: Subcostal incisional Hernia

Results and Observations

All the patients were observed in immediate post-operative period for 8 days till discharge. No patient developed any complications related to wound closure like infection, seroma or hematoma. During follow up in O.P.D. none had developed weakness or hernia through wound.

Discussion

Subcostal incisions are usually closed by layered technique [6], just like lumbar incisions [7]. Incisional hernias through lumbar and subcostal incisions are relatively less studied. At our institute, due to more frequent use of open than laparoscopic surgery, we have observed more such hernias. Although wound complications like infection and inappropriate technique can lead to hernia, these surgeries are relatively clean and infections are rare. So, we thought that surgical technique we use must be at fault. We were using polyglactin 1 no. layered, continuous closure. Continuous nature of closure might hamper blood supply of cut edges of muscles. Delayed absorption of suture may give inadequate strength. Braided nature may damage tissue more with more chances of infection. We shifted to nylon 1 no. intermittent, mass closure. Advantage of nylon is that it has a smooth surface which slides easily through the tissues, reducing the risks of tissue necrosis and bacteria adherence [8,9]. Results were excellent and none had developed hernia post-operatively. It seems that

1. Delayed absorbable suture is not appropriate for closure of these incisions.
2. Layered closure does not give enough strength. It is possible that during closure some muscles may not be appropriately approximated due to contraction, leading to hiding of one muscle underneath another muscle and three-layered closure is not achieved.
3. Continuous nature of closure where there is no tough structure (like linea alba) , is inappropriate.
4. Three polyglactin 1 no. sutures cost between 1500 to 1800 rupees, while 2 nylon 1 no. loop sutures cost around 500 rupees leading to direct saving of 1000 rupees. This much saving is very important in poor countries.

Conclusion

We conclude that intermittent, mass closure of lumbar and subcostal incisions using non-absorbable 1 no. nylon suture is an effective and cost-effective method to prevent post-operative weakness and hernia in these incisions.

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