



Incisional Hernia Repair: Current Perspectives

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Incisional hernia (IH) is a common and challenging problem after midline laparotomy and other operations on the anterior abdominal wall. It is estimated that 10000 patients in the United Kingdom and 100000 in the United States of America undergo IH repair annually. The incidence of IH ranges from 10-38%, which causes deterioration in the quality of life from pain, disability, dissatisfaction, risk of strangulation and high costs.¹ Despite significant advances in the methods of repair of IH, including prophylactic repairs, the incidence of recurrence after repair of IH remains unacceptable (12-24%), and those who experience recurrence, pose greater technical challenges with increased risk of recurrence and morbidity.

Obesity, smoking, diabetes, immunosuppression (organ transplantation, rheumatoid arthritis, malignancies), wound infection and defective collagen metabolism (abdominal aortic aneurysm) are risk factors for IH.² The aim of this paper is to overview the outcomes of different modalities of repair IH repair, including suture vs. mesh, open vs. laparoscopic, location of the mesh (onlay, sublay and inlay), prophylactic repairs and ongoing trials.

Classically, IH is repaired by approximating the anatomical layers around the defect with both absorbable or non-absorbable suture materials with a recurrence rate of 12-54%, whereas open mesh repair (onlay, sublay and inlay) results in recurrence rate of 2-36%.

In 1980, Jenkins from UK, repaired IH by performing mass closure of the wound using non-absorbable double-stranded nylon suture with the length of the suture being 4 times the length of the wound and placed the sutures not more than 0.5 cm apart and 2.5 cm from the edge of the wound. He observed 10% recurrence rate.³ A randomised trial comparing IH repair using absorbable polydioxanone and non-absorbable polypropylene sutures did not show difference in the outcomes.⁴

The European Hernia Society has adopted sublay mesh repair as the gold standard open method of IH repair because of low recurrence rate, where the mesh placed is over the closed peritoneum and posterior rectus sheath.⁵ It is now accepted that only IH with smaller than 3cm defects should be repaired by primary tissue approximation with sutures. A Cochrane review has confirmed that open mesh repair is superior to suture repair in terms of recurrence, but inferior in terms of wound infection and seroma formation.⁶

Laparoscopic IH repair has emerged as a promising technique which allows visualisation of all defects from within, but has the disadvantage that the repair relies fully on the strength of the mesh and its fixation to abdominal wall. In this technique, a composite mesh is placed in the intraperitoneal plane, known as intraperitoneal onlay mesh (IPOM), and the hernia defect is not closed. Laparoscopic repair is not always possible in large IH, those lying close

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to the costal margin or pelvis where adequate of the mesh is not possible. Leaving behind the large sac with persistent defect may produce worse cosmetic result compared to open repair.

A 2011 Cochrane review of 10 randomised-controlled trials (RCTs) including 880 patients concluded that laparoscopic repair was safe with reduced risk of wound infection, shortened hospital stay and associated with fewer complications than open repair.⁷ Level I evidence of benefits and disadvantages of laparoscopic repair are scarce and long-term recurrence rates are unknown. In one RCT, the short-term recurrence rate was higher in the laparoscopic group (18% vs. 14%; $P=0.1$).⁸

Chronic pain, defined as pain lasting for more than three months post-operatively, after IH occurs in 10-20% of cases due mesh-associated inflammation, nerve damage from mesh fixation, nerve entrapment, tension in the mesh fixation and recurrence at the repair or port sites. A computerised tomographic scan should be done to exclude a recurrence. Failure of the pain to respond to medical management may require removal of fixing tacks or sutures or replacing the mesh.⁹

Several techniques of closure of laparotomy wounds have been examined for the prevention of IH. A prospective RCT (STICH Trial) compared the incidence of IH among 560 patients who underwent abdominal surgery employing midline incisions where wounds were closed either by small tissue bites of 5 mm every 5 mm or large bites of 1 cm every 1cm using 2/0 polydioxanone suture. The incidence of IH, at 1-year follow-up, was 21% in the large bite group and 13% in the small bite group (OR 0.52; $P=0.022$;) indicating

better outcomes with small bite technique.¹⁰

A recent RCT (PRIMA trial) has evaluated the effectiveness of prophylactic mesh reinforcement in high risk patients who underwent midline laparotomies for the prevention of IH. Primary suture, sublay mesh reinforcement or onlay mesh reinforcement were undertaken in patients undergoing abdominal aortic aneurysm repair or patients with body mass index $>27 \text{ kg/m}^2$ undergoing gastrointestinal, biliary tract, urological and gynaecological surgery. The observed incidence of IH was 30% in primary suture group, 13% in onlay group and 18% in sublay group, thus indicating a potential for the onlay reinforcement technique in prevention of IH in midline laparotomies.¹¹

In Germany, a RCT (CONTINT Trial) designed to assess the incidence if IH using continuous or interrupted suture techniques after emergency laparotomy, is recruiting patients.¹² Similarly, another RCT (HART Trial) in Wales, UK, is underway, which is designed to compare the Cardiff suture technique (far-near-near-far) with standard mass closure to assess the incidence of IH.¹³

This paper has highlighted the current practice of surgical treatment of IH and the ongoing research studies designed to establish the most effective method for prevention of IH. It is evident that IH is a major problem after abdominal surgery and no single currently available method of repair is satisfactory. The modality of treatment for each patient needs to be based on the anatomy of the IH, risk profile of the patient, surgical expertise and the experience of the centre.¹⁴

Conflict of Interest: None.

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