Hernia (2020) 24:209–211
https://doi.org/10.1007/s10029-019-02052-1

LETTER TO THE EDITOR

Fixation techniques in inguinal hernia repair, what is really new?

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Received: 27 August 2019 / Accepted: 9 September 2019 / Published online: 26 September 2019

The development of new operation techniques and advancements in mesh technologies could not change the fact that chronic pain remains the most severe postoperative complication in open and laparoscopic hernia surgery [1]. While laparo-endoscopic repairs such as TAPP and TEP are favorable regarding less chronic postoperative pain in comparison to open procedures, the discussion of mesh fixation techniques in laparo-endoscopic as well as in open inguinal hernia repair is still a hot topic.

In open inguinal hernia repair, the classic technique published by Parviz Amid [2] is performed by fixing the caudal portion of the mesh with a non-resorbable running suture sized 0 or 2/0 to Cooper's ligament and the inguinal ligament, respectively. Two to three interrupted sutures to the anterior rectus sheath and aponeurosis of the internal oblique muscle, respectively, attach the mesh medially and cranially. In this context, it is important to emphasize the importance of the intramuscular portion of the iliohypogastric nerve representing a potential location for injury.

An international multicenter-TiMeLi-trial [3] demonstrated a reduction of early postoperative pain associated with similar recurrence rates at 1-year follow-up using fibrin glue mesh fixation in Lichtenstein repair of uncomplicated unilateral primary inguinal small- to medium-sized hernia instead of suture fixation. For the subgroup of patients at risk for pain, a significant advantage was seen in the glue fixation group [4]. In another multicenter trial, the FinnMesh Study [5, 6], three different mesh fixation groups (butyl-2-cyanoacrylate tissue glue, absorbable polyglycolic acid sutures, self-fixating mesh group) revealed equal results in terms of chronic pain and recurrence rate in a 7-year follow-up. Multivariate regression analysis of this study [7] detected that only new recurrent hernias and high pain scores at day 7 were predictive factors for longstanding groin pain.

In summary, the scientific evidence supports atraumatic mesh fixation by glue or self fixating meshes in Lichtenstein repair without increasing the risk of recurrence and gaining the benefit of less acute postoperative pain. Key in the prevention of chronic pain in open inguinal hernia repair is primarily based on a standardized technique including a meticulous identification and handling of nerves as well as mesh fixation with special attention to the variable course of the inguinal nerves. The education of a standardized step by step Lichtenstein procedure and all other open repairs are mandatory and the most important precaution for intra- and postoperative complications.

Looking back to the start of laparo-endoscopic inguinal hernia repair in the early 90s, the primary aim was defined by achieving low rates of complications especially recurrences [8]. At that time, the technical aspects of dissection and parietalisation were almost the same as today except for the kind of fixation, which was performed by penetrating staples and tacks without exception. The only recommendation was to omit any kind of fixation in the triangle of doom and trapezoid of pain. The use of more than 8–10 fixation devices for mesh fixation was even increased by several tacks or stapler to close the peritoneal incision in TAPP procedures. In the opposite mesh fixation in TEP was not an issue except for large-sized direct inguinal hernias [9].

So far chronic pain was not in the primary endpoint in RCTs. With the start of using fibrin glue as well as non-fixation in selected cases for mesh fixation in TAPP and TEP, the discussion started again to find the best mesh fixation to prevent recurrences and chronic pain.

Some of the hernia experts at this time already had concerns about the need and efficacy of glue fixation. Especially in TEP procedures the overwhelming percentage were done without any fixation even in big size or bilateral inguinal hernias [9]. The reason for this difference in comparison to the TAPP lies in the technique of access in TEP including the desufflation at the end of the operation leading to an immediate compression of the intact peritoneum to the mesh and underlying tissue providing a safe fixation.

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Not astonishingly almost all studies comparing fixation versus non-fixation were performed in TEP procedures, detecting no differences in recurrence rates [10]. In contrast, the TAPP studies focused on penetrating fixation versus glue fixation [11]. The theoretical advantage of less chronic pain in case of absorbable in comparison to permanent tackers was based on an error without taking into account the time of absorption of the new absorbable devices (8–12 months) and the start of chronic pain after 3 or 6 months [12].

The trend in laparo-endoscopic surgery in the last years is to have no mesh fixation at all except in big direct inguinal hernias [13, 14]. The convincing advantage of complete atraumatic glue fixation is to prevent any kind of damage to nerves or vessels, which might also be a crucial benefit for surgeons starting with these procedures. Besides the knowledge of the risk of injuries to vessels and nerves in the triangle of doom and trapeziod of pain, respectively, by penetrating fixation devices, the published data of the cadaver study by Wolfgang Reinpold detected a broad variability of the course of the inguinal nerves [15]. Based on these findings, the area of triangle of doom and trapezoid of pain has to be augmented for prevention of nerve injuries.

Of course, the strategy of a precise dissection in the correct tissue plane is key to preserve the spermatic sheath following the standardization of TAPP and TEP procedures [16, 17].

In case of the need for mesh fixation, the use of glue is strongly recommended by the HerniaSurge group [18]. For the discussion which type of glue should be preferred, some aspects of efficacy and safety should be considered. The essential difference between the physiological glue, the fibrin glue and the synthetic cyanoacrylate glue is the kind of application. Fibrin glue fixation can be used by spray application achieving a broad elastic fixation to the underlaying tissue whereas the synthetic glue should only be used at very few spots because of the glue plaques following due to the chemical reaction.

The first studies and reports of mesh fixation by physiological fibrin glue in TAPP and TEP [19, 20] revealed excellent results regarding postoperative pain and low rates of recurrences. The use of cyanoacrylate in TAPP obtained similar results in the long term published by Jan Kukleta [21]. Other reports regarding the successful application of self-fixating meshes with micro-hooks in open as well in laparo-endoscopic repairs also revealed excellent results [22, 23]. The application especially in TAPP and TEP is not as easy in comparison to glue fixation and the micro-hooks responsible for the fixation forces are not really absolute atraumatic.

In conclusion, the mesh fixation in TAPP and TEP repair should only be performed in big-sized medial inguinal hernias. In these cases, atraumatic glue fixation always in combination with inversion of the extended transverse fascia to prevent seroma formation and to achieve a tissue plane in contact to the mesh should be preferred.

In summary, the mesh fixation in TAPP and TEP changed completely from penetrating devices to non-fixation and glue fixation in the last decade. But also in open inguinal hernia repair, glue and micro-hook mesh fixation received broad popularity.

Compliance with ethical standards

Conflict of interest The author declares no conflict of interest.

Ethical approval Approval from institutional board was not required for this communication.

Human and animal rights This article does not contain any studies with human participants or animals.

Informed consent For this retrospective review, formal consent is not required.

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