

15. Recurrent Inguinal Hernia: The Best Approach

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Recurrence is, with chronic pain, among the most challenging complications of inguinal hernia repair. The true incidence of recurrence remains difficult to determine. While many authors tout a low recurrence rate for their technique, their personal series or team results, large series [1, 2], or national registries indicate that as many as one of five hernia operations (17%) are for recurrent hernia [3]. As this is only a surrogate of the true recurrence rate, however, recurrence may be even higher because (a) the definition of recurrence varies considerably from one report to another, (b) follow-up is not always complete [4], (c) not all patients recognize or complain of their recurrence or go back to their surgeon [4], and (d) not all recurrences undergo reoperation.

The best approach to treat recurrent hernia has been a subject of debate for years, both in the open and later, in the endoscopic arenas. By “approach,” we mean the overall approach to the problem (technique, use of mesh), not just the anatomic, surgical approach. “Anterior” and “posterior” refer to the anatomic surgery approach, whereas pre- and retrofascial refer to the anatomic placement of mesh. The actual techniques used have been described elsewhere and will not be highlighted in this chapter, which will concentrate on the indications.

Mesh repair has been shown to decrease the re-recurrence rate [5] as compared to suture techniques. Based on the previous experiences of Cheatle in 1920 and Henry in 1936, Nyhus largely popularized the preperitoneal approach, stressing the advantage of going through fresh, unscarred tissue for his mesh repair [6], and especially when dealing with recurrent hernia [7]. Later on, this idea resurfaced when the proponents of laparoscopic hernia repair emphasized that the endoscopic technique also entailed a posterior (retrofascial) preperitoneal mesh. Of note, at that time, the majority of

the recurrences were due to failures of anterior, most often tissue, repairs and also, sometimes, after prefascial mesh repair. Today, we face the quandary that recurrence can occur after a posterior as much as an anterior repair and/or after almost any type of mesh repair.

But there is more to the question than choosing the “best anatomic approach,” i.e. the surgical technique adapted to the previous route for repair. On one hand, there are the characteristics of the previous repair: was the previous repair tissue only or with mesh, which incision was used, and last, was the postoperative course complicated or not; on the other, there are the characteristics of the recurrence (type, number, site, and size of the defects; the number of previous repairs; and the presence of a sac). Last, it is also important to eliminate risk factors: not only are there factors that may already have been present during the initial or preceding repair and are responsible for the first recurrence (it would not be wise to leave these factors uncorrected for the second operation) but because recurrence itself should now be considered a high risk factor. Every effort should be made to correct or minimize as many of the other risk factors as possible.

Factors Related to the Previous Repair

Whether the Previous Repair Was a Tissue Repair or a Mesh Repair

Primary repairs that place mesh in the preperitoneal space (such as Kugel patch, Prolene Hernia System, plug, or endoscopic repair) make subsequent laparoscopic repair more difficult, because of scarring in the preperitoneal space. Recurrence rates after mesh repair differ with the type of repair, ranging from as low as 1.3% for the Lichtenstein onlay repair to more than 27% for the Kugel repair. If one of these techniques is considered for repair of recurrence, the surgeon should be conscious of these recurrence rates when performing subsequent repairs [8].

Site of the Incision

Likewise, it would seem logical to avoid going through the same incision to repair the recurrence. This would avoid the difficulty in dissection of the different planes that have often amalgamated during

healing of the previous operation, potentially exposing the cord structures to accidental injury, if this route were anterior. Specific problems can arise in the plug and Kugel techniques as the mesh is placed posterior to the transverse muscles but through an anterior route. If however the operation were meant to remove infected mesh, then this would be the least devastating route. A distinction between the open and laparoscopic repairs is that the incision of most open anterior repairs lies directly or near the repair, while the incision for the open or laparoscopic preperitoneal operations is usually at some distance from the repair (mesh). The probability that the cord structures are exposed to injury when accomplishing an anterior approach in recurrent hernia must therefore be foremost in the minds of the surgeon undertaking the repair of recurrent inguinal hernia to avoid devascularization of the testicle or injury to the nerves and/or the vas deferens, notably often anterior to the other cord structures and particularly vulnerable in this setting.

Postoperative Course of the Previous Repair

Drawbacks of mesh repair are well known. If the mesh must be removed because of intolerance due to chronic pain, sensation of foreign body, or infection, this would most likely be easiest through the same approach as the previous operation. The repair could be performed during the same operation or ulteriorly through a different approach.

Factors Related to the Recurrence

Type

Whether the recurrence is direct or indirect does not influence the repair.

Number of Defects

All potential sites (orifices) have to be covered [9, 10].

Site

Pelissier et al. [11] remind us that all recurrences are through the myopectineal orifice. An oblique external recurrence through the inguinal canal might well be treated as a primary hernia, whereas a small, sclerotic hole near the pubic tubercle would pose problems of purchase if a suture repair was decided and problems of adequate overlap if a mesh repair were entertained. Most recurrent hernias after tissue repair are located in the inguinal canal (insufficiently treated prehernia lipoma or unrecognized sac?) or just above the pubic tubercle. Recurrence after an anterior mesh repair technique (Lichtenstein and plugs) is found either over the pubic tubercle [12] or around or lateral to the internal ring or, sometimes, both medially and laterally (with the plugs). With the use of the larger meshes, whether through the open or endoscopic route, the recurrences can occur almost anywhere as they are usually attributed to poor technique, migration, shrinking, and plicature... [9]. The femoral canal orifice warrants special mention. As nearly 9% of recurrences are in fact femoral hernias, and dissection medial to the inguinal ligament should eliminate this eventuality. In cases where femoral hernias are present, Itani et al. [8] caution against use of a plug and recommend exposure of Cooper's ligament and lateral fixation of the new mesh to Cooper's ligament.

Size

A small orifice might lend itself easily to a plug (either Perfix or PHS) technique, whereas a full-blown destruction of the inguinal wall (truly an incisional hernia) would require some form of onlay mesh opposition or a plasty.

Number of Previous Operations/Recurrences

If both an anterior (tissue or mesh) and posterior repair have already been performed, there is considerable scarring both in front and behind the transverse plane. The choice of technique is difficult and depends on surgeon preference and expertise. To this, we might add that the preperitoneal space might be difficult to access because of previous radiation therapy, a vascular procedure, or surgery on the bladder or the prostate.

The Presence of a Sac

Obviously, a sac left behind during the index operation is an obvious cause of recurrence (“reappearance”) of the hernia and must be treated when dealing with the recurrence. Aside from this particular setting, and as long as the sac is treated, there is currently nothing in the literature today to indicate whether a new or old sac, found or not, or whether the sac was excised or inverted in the previous operation, matters much in the next repair.

Techniques Used for Recurrent Inguinal Hernia

The use of the preperitoneal, retrofascial space for hernia repair was first performed by Usher in 1958 [13]. In accordance with the principle to use mesh for recurrent hernia repair [5], prosthetic reinforcement made its entry to the therapeutic armamentarium when Nyhus introduced the “buttress” technique, i.e., a preperitoneal mesh that reinforced a tissue repair for recurrent hernia [7]. The “giant prosthetic reinforcement of the visceral sac” technique, propagated by Stoppa and his followers in France, was one of the first techniques addressing the specific problem of recurrent hernia [7, 14–16] covering the defect, without sutures [15, 16].

Anterior prefascial repairs have its partisans. Both the Lichtenstein [17–19] and the Gilbert [20] repairs have been suggested as suitable for repair of recurrent inguinal hernia.

In 1993, Lichtenstein and coworkers [19] enumerated five principles that should be entertained when repair of recurrent hernia is accomplished through an anterior approach: (1) do not depend on fascial structures to close or reinforce the defect, (2) reinforce the entire inguinal floor irrespective of the type of hernia, (3) avoid all tension on suture lines, (4) avoid use of scarred or devascularized tissue in the repair of recurrent hernias, and (5) use a large prosthetic material to reinforce the entire inguinal floor permanently. Actually, these principles should probably apply to all types of repair of recurrent hernia, irrespective of the approach. The logical consequence of point number 4 would be to use the endoscopic or open posterior route for recurrence that has occurred after an initial open anterior repair and to consider the open anterior route for recurrence of an endoscopic repair.

With the advent of laparoscopic or endoscopic hernia repair, several authors lauded that minimal invasive techniques, also placing a mesh in the preperitoneal space, could be a specific indication for the repair of

recurrent hernia. As that time, most hernia repairs (and therefore recurrences) were through the open, anterior route. Among the advantages of the preperitoneal approach is the facility with which all the potential defects can be detected and covered [21, 22].

When the laparoscopic approach is selected (failed anterior repair), the minimal invasive (laparoscopic) route combines satisfactory re-recurrence rates and less pain medication requirements as shown in a randomized controlled trial from Finland [23], but contrasting with the results of an earlier, smaller, controlled randomized trial [24], in which, although the morbidity was lower, the recurrence rate was higher with TAPP compared with GPRVS. However, when one considers the complexity of the operation and the re-recurrence rates, the open preperitoneal prosthetic mesh repair was considered the best repair. This was also confirmed by Itani et al. [8] who found that mesh removal by endoscopic techniques can be difficult if not impossible (instruments are not strong, inadequate cutting and energy).

Of importance as well is to consider the number of recurrences and how badly the anatomy may be distorted; in particular, how well Fruchaud's myopectineal orifice has been covered in the original (or last) repair [9–11] or, more importantly, how well it is, or may be covered at the time of consideration for repair [8].

In a meta-analysis on seven randomized studies comparing two different techniques for recurrent inguinal hernia repair, Dedemadi et al. [25] pooled the effects of outcomes in 1,542 patients enrolled into five randomized controlled trials and seven comparative studies, using classic and modern meta-analytic methods. They found that there were significantly fewer cases of hematoma/seroma formation in the laparoscopic group compared with the Lichtenstein technique; the relative risk of overall recurrence was higher [3, 25] in the transabdominal preperitoneal group compared with the totally extraperitoneal group. Their conclusion was that laparoscopic versus open mesh repair for recurrent inguinal hernia was equivalent in most of the analyzed outcomes. However, they did not analyze the outcome according to the type of index repair or any of the other hernia or recurrence characteristics enumerated above.

Classifications and Therapeutic Deductions

Classifications should describe the anatomic location, include anatomic function (competency of the internal ring, integrity of the direct floor, defect size, and descent of sac), be reproducible for both hernia

specialists and general surgeons, be easy to remember, be applicable to anterior as well as posterior approaches, to laparoscopic as well as open repair, [26–28], lead to a tailored overall approach of repair [26] (mesh vs. suture, anterior vs. posterior surgical approach, pre- or retrofascial placement of the mesh), and serve to compare outcomes between different techniques and patients. Several shortcomings, however, plague the cornucopia of existing hernia classifications, including the composite classification by Zollinger [27, 28]: (1) classifications with preoperative descriptions are limited to what the examiner can see or palpate and do not always predict the true intraoperative anatomical conditions (it is known that the preoperative determination of direct or indirect hernia is incorrect in 50% of cases [29], and the EHS [30] stated that any effort for preoperative distinction was “useless”); (2) recurrent hernia, a clinical variable, has been “added” to a list of anatomical variables, usually lumping all types of recurrent hernia into the last “potpourri” category (the most advanced), without much distinctive details. Several other authors have similarly only added a “R” to the anatomic categorization as for primary hernia [27, 28] to designate the recurrent aspect of the hernia; (3) last, when classifications are too simple, a complete description is not possible, and it becomes difficult to “tailor” the repair to the exact type of recurrent hernia.

To the best of our knowledge, only one classification specifically deals with recurrent hernia [31], but is incomplete as well. Certainly, this classification takes into consideration how many recurrences have occurred (first, second, or more), the site (near the internal ring, above the pubic tubercle, whole inguinal wall), the size ($>$ or $<$ 2 cm), whether the sac is reducible or not, and patient characteristics such as obesity, and all factors that have been considered as risk factors of further recurrence. However, in this classification, the above-mentioned variables are poorly delineated and compacted into only three grades: R1, R2, and R3 (Table 15.1). The authors give preferential advice according to whether the previous repair was anterior or posterior only in the R2 category. They do not distinguish between previous mesh and suture techniques.

Guarnieri [32] classified recurrent hernia into four categories: (1) high recurrent hernia (1/3 superior, i.e., hernia close to the internal ring and occupying not more than 1/3 of the posterior wall), (2) low recurrent hernia (1/3 inferior, i.e., hernia close to the pubic tubercle and occupying not more than 1/3 of the posterior wall), (3) total recurrent hernia (the entire or nearly the entire posterior wall is involved), and (4) multiple recurrent hernia (more than one hernia opening).

Table 15.1. According the Campanelli classification, recurrent hernias can be divided into three types.

Type R1: first recurrence “high,” oblique external, reducible hernia with small (<2 cm) defect in nonobese patients, after pure tissue or mesh repair
Type R2: first recurrence “low,” direct, reducible hernia with small (<2 cm) defect in nonobese patients, after pure tissue or mesh repair
Type R3: all the other recurrences – including femoral recurrences; recurrent groin hernia with big defect (inguinal eventration); multirecurrent hernias; non-reducible, linked with a contralateral primitive or recurrent hernia; and situations compromised from aggravating factors (e.g., obesity) or anyway not easily included in R1 or R2, after pure tissue or mesh repair

Recommendations and Indications

It is primordial to carefully review previous operative reports to correctly choose between the available techniques for subsequent recurrent hernia repair according to the above-mentioned variables.

When mesh is chosen, light-weight meshes have some advantages with respect to long-term discomfort and foreign-body sensation in open hernia repair, but are possibly associated with an increased risk for hernia re-recurrence (possibly due to inadequate fixation and/or overlap).

The European [30] recommendations for recurrent hernia are the following: if the previous repair was through an anterior route, consider open preperitoneal mesh or endoscopic approach (if expertise is present, and preferably TEP rather than TAPP), and if the previous repair was through a posterior route, consider an anterior mesh (Lichtenstein). After conventional open repair, endoscopic inguinal hernia techniques result in less postoperative pain and faster convalescence than the Lichtenstein technique. Itani et al. [8] based their decision on whether the index repair was a tissue or mesh repair. If the initial repair was a tissue (anterior) repair, then either the anterior or posterior approaches can be used to repair the recurrent hernia [8]. If the initial repair was a mesh repair, then the recurrence repair should preferably employ an approach in the space in which the tissue planes have not been violated previously [8]. An anterior approach is clearly the best choice after failed posterior repair, no matter if it was performed open or laparoscopically.

The International Hernia Society [10] recommends not to try to remove preperitoneal mesh endoscopically, but to place a second mesh over the first. If the original mesh was a plug, the prominent part of the plug should be divided, better by electrocautery than by scissors, so that a flat mesh can be applied.

In patients with an R1 recurrence, according to Campanelli [31], most authors [26, 30, 31, 33–35] prefer a Gilbert's plug repair through an anterior approach, under local anesthesia.

In patients with an R2 recurrence, Campanelli [31] and Miserez [26] perform a preperitoneal modified Wantz repair [15] under local anesthesia. If R2 recurrence is secondary to a previous preperitoneal mesh repair, an anterior approach with a Lichtenstein, Gilbert, or Trabucco repair is preferable. In both cases, only local anesthesia is used, and the patient is discharged immediately.

In patients with an R3 recurrence, Campanelli [31] and Miserez [26] prefer a Stoppa operation by preperitoneal approach, the Wantz technique, or the laparoscopic technique for either the uni- or bilateral hernia.

There are two groups of patients in whom a second preperitoneal dissection might be considered [36]:

1. Those with multiple recurrent hernias where both spaces have already been dissected [37].
2. Those who insist on an endoscopic reoperative approach. The latter most commonly occurs when the herniorrhaphy on the recurrent side was laparoscopic and the patient has had a previous open repair on the opposite side [38].

In patients for whom previous mesh was used, special caution is warranted. The mesh may be tightly adherent, and sometimes, heavy fibrosis envelopes the cord structures, making it particularly difficult to distinguish between these structures and surrounding tissues. Careful and cautious dissection to clearly identify the cord structures is mandatory to avoid inadvertent division or injury to the vas deferens or nerves or, worse, devascularization of the testicle, often ending in orchiectomy [21]. Certainly, these patients should be informed of the (remote but not zero) possibility of orchiectomy.

Indications for mesh removal are ill defined, but most authors overlay mesh unless there is infection [10]. Complete removal of the mesh is most often impossible, and careful delineation of the anatomy and myopectineal orifice is most important. When complete removal is impossible or hazardous, placement of an additional, overlapping mesh avoids the necessity of further dissection and damage to the underlying structures, especially through the endoscopic route where the bladder and iliac vessels are at risk [10]. The second mesh should overlap the first in the area of recurrence and be solidly anchoring to healthy fascia and inguinal ligament, as well as to the previous mesh in areas where the mesh is well incorporated to the inguinal ligament laterally and rectus

Table 1.5.2. Summary of recommendations according to the initial anatomic approach.

Previous repair route	Mesh	Itani	EHS	Campanelli	Schwab
Anterior	Yes	A ^a , P, E	A, P, E	R1: G R3: St, W, E	Need to remove mesh No need
Posterior	No	A, P, E		R2: W	
	Yes	A	L	R2: L, GT	Need to remove mesh No need

A open anterior mesh repair (Lichtenstein (L), Gilbert (G), Rutkow, Trabucco (T)), P open posterior mesh repair (Stoppa (St), Nyhus, Wantz (W), Read, Rives (R), Kugel), E endoscopic posterior preperitoneal repair (by TEP or TAPP)

^aSecond mesh

fascia medially. Additional dissection and damage to underlying structures will thus be avoided. Among the risk factors for recurrence, some if not most are amenable to preoperative correction. These include technical factors such as the use of short-term absorbable sutures for rraphy or mesh fixation [39] and insufficient coverage when mesh is used [9, 11], and patient-related factors including smoking and to a certain degree, obesity.

Schwab and Klinge [40] proposed the following algorithm for the treatment of recurrent mesh repair according to whether or not the previous operation was complicated or not and whether prosthetic material should be removed or not. If the postoperative course of the preceding operation was uneventful, these authors propose an endoscopic or open posterior repair when the initial route was anterior and the Lichtenstein anterior repair when the initial operation was a posterior repair. If, however, the previous operation was followed by a complication, the authors advise an anterior or posterior transinguinal revision. If the endoscopic route is chosen, practically only the TAPP technique is possible, the TEP is reputed to be too difficult [41]. If the prior operation was an anterior mesh (Lichtenstein) repair, then an open posterior repair (Wantz or Stoppa) seems appropriate.

The use of local anesthesia for recurrent hernia is not well studied. Obviously, endoscopic repairs are always performed under general anesthesia. Theoretically, all other procedures can be done under local anesthesia. However, the increased complexity and longer dissection times are characteristics that might preclude the use of local anesthesia. Table 15.2 summarizes the therapeutic potentials according the recommendations of the authors who have tried to systematize repair.

Conclusion

In conclusion, we recommend the following: when faced with *recurrence after tissue repair*, the surgeon can choose between an open anterior (Lichtenstein plug, or plug and patch, or Prolene Hernia System) repair, an open posterior (Read, Rives, Stoppa, Kugel, Nyhus, Wantz) repair, and a laparoscopic (TAPP or TEP) repair, essentially based on the size of the hernia defect and surgeon preference and/or expertise [3].

If dealing with a *recurrence after a mesh repair*, the technique of repair will depend on surgeon experience and on which anatomic

approach was used for the previous operation (anterior or posterior). For *recurrence after mesh placed through an open anterior approach*, then a Read, Rives, Stoppa, Nyhus, Wantz, Kugel, or a laparoscopic (TEP OR TAPP) approach may be used.

For *recurrence after mesh placed through a posterior* (laparoscopic for example) *approach*, the recommendation is to perform a laparoscopic TAPP (if experienced in laparoscopy) or an open Lichtenstein, Prolene Hernia System, or plug and patch technique if experienced in open techniques. Decisions may be based on the size of the hernia defect and surgeon preference and/or expertise [3].

If mesh removal is needed, it is most likely best removed through an open anterior approach, while some isolated plugs can be removed safely laparoscopically. *If a second mesh repair is envisioned* in the same operation, we propose an endoscopic or open posterior repair when the initial route was anterior and the Lichtenstein anterior repair when the initial operation was a posterior repair.

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