Editorial Opinion

Hernia repair: why do we continue to perform mesh repair in the face of the human toll of inguinodynia?

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Abstract
Fifteen to 20 years ago, transversalis and Shouldice Hospital repairs were standard, with a 4% to 6% rate of recurrence. With a focus on recurrence, various mesh repairs were proposed to reduce the incidence of recurrence. With these repairs, an increased incidence of inguinodynia due to the entrapment of the nerves proximate (adjacent) to the mesh has been observed. Many surgeons doubted its existence; however, there is sufficient evidence that with mesh repair in which the affected nerves are resected, the incidence of severe pain is lessened considerably. Triple neurectomy has been proposed as a therapy, but only 80% of patients are relieved of pain. Recurrence is insufficient to make patients’ lives miserable, with mesh repair reporting up to a 21% incidence of inguinodynia. Although few surgeons today perform this procedure and most residents have never seen it, the author proposes that mesh repairs be abandoned and the transversalis or Shouldice Hospital repair be adopted.

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Inguinodynia

Surgeons have often been accused of idolatrous behavior, often naming procedures after themselves (not unusual in any field); however, this has led prominent surgeons who have trained many disciples to be worshipped as idols. Unfortunately, this seems to be part of the discipline, and it is rare that anyone protests against this. One such event took place when Sir William Heneage Ogilvie, a prominent English surgeon, was asked to serve as visiting professor to Johns Hopkins Hospital. While there, he was subjected to the usual idolatrous treatment of Halsted so typical of Johns Hopkins and other major medical centers, whereby chiefs of surgery were regarded as larger than life. For example, “Halsted said this and Halsted said that and Halsted did it this way”; finally, half in exasperation, Sir Heneage is quoted to have said, “Halsted’s sayings are not foxholes in the sand to be defended against all time.” It was rumored that Sir Heneage was asked to leave that same day.

Operations and procedures go through fads, or, better stated, acceptance of procedures is based on inadequate evidence as uttered by someone who is often a giant and a leader in American surgery. Meaning no offense, Professor Wangensteen of Minnesota, a giant in American surgery who trained a host of well-known and accomplished surgeons, decided without adequate evidence that gastric freezing would be a good method to treat gastric bleeding. Whatever the outcome of Wangensteen’s invention, by all descriptions the atmosphere at the University of Minnesota under his leadership was electric. There were ideas a minute, some of which did not work out, but it was an intellectually challenging environment. Because of this, gastric freezing became accepted without a great deal of evidence, and I remember when my own institution got its freezing machine. Needless to say, when it was finally subjected to a proper test of whether it was efficacious, it

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failed to stop gastrointestinal bleeding. Gastric freezing was then abandoned. Despite this, Dr. Wangensteen was not diminished. Every inventive surgical leader had some wins and some losses, and he was enthusiastic and trained many surgeons who were giants in their own right. But at other times, things happen for reasons that are difficult to trace.

Such is the story of inguinal hernia and its repair. During my residency at Massachusetts General Hospital, the residents were taught that Cooper’s ligament was the best repair (Anson-McVay repair). I am not certain why. I was told that it would prevent femoral hernias from occurring. It seemed strange, because the incidence of femoral hernias in male patients was approximately 1%. Yet because I was a dutiful resident (most of the time), I followed the dictum. When I completed my residency and joined the staff, I was initially not very busy surgically by intent and did not operate very much the first 3 years. I received a National Institutes of Health grant I wrote while chief resident, set up a research lab, and also set up the TPN Program, which had enormous numbers of patients from the eastern half of the United States. Because of this, I had a large lab with a number of fellows, many of whom have done exceedingly well and have become chairs of their own departments. Gradually, I became busy surgically. When I had to perform a hernia repair, I knew how to do the Cooper’s ligament repair; however, I noticed that there was more postoperative pain with the Cooper’s ligament repair, so I started doing the conventional repair but with special attention to the transversalis fascia. It was not the Shouldice type of repair, of which all of us were aware, which in its classic execution demands that one cut through the transversalis fascia and then reef it up, repairing it, but we did in fact tighten up the transversalis fascia, resulting in increased strength of the repair. I also noted that there was less pain with this transversalis fascia repair, paying special attention to the inguinal ligament and the conjoined tendon, and I observed few recurrences and noted very little pain.

Then I noticed that surgeons were suddenly worried about recurrence. Indeed, the incidence of recurrence at that time as reported in large series was no more than 4% to 6%, and the incidence of post–inguinal repair pain was 2% to 4%, which seemed to me very satisfactory results.

A cottage industry sprang up of different hernia orifice repairs done with various types of mesh, most of which were plastic. Postgraduate courses were held almost weekly, and there were different types of repairs, each with a different type of what I call plastic but in fact was mesh. There was the plug and patch, originated by my good friend Dr. Arthur Gilbert in Florida; Delta Airlines sent all its patients to Dr. Gilbert and his hernia hospital, where the procedure was performed on an outpatient basis. There was the Kugel repair, the Lichtenstein tension-free repair, and variants of the plug and patch, and surgeons happily performed these repairs knowing that there would be very little chance of recurrence.

On the other hand, I began seeing patients with post–inguinal hernia repair pain. Because my practice has always been patients with everybody else’s troubles, inguinodynia became a real issue for the patients I saw. Many of these were patients with pending litigation, and it became very difficult to tell whether these patients were experiencing inguinodynia or the legal system was grinding slowly to finally adjudicate whether they did have inguinodynia, and frankly, I found it very difficult to tell. As I discuss this with other surgeons, they seem as flummoxed as I am to determine when patients are malingering. I know of no way to differentiate.

Most herniotomists (as I called them at that time) denied that there was such a thing as inguinodynia. I argued that although there might be some aspect of malingering so that there could be a legal payoff, it occurred far too often and appeared to ruin the lives of these patients, which very few surgeons seemed to acknowledge.

Five percent of the male patient population will develop inguinal hernias at some point in their lives, and if they undergo repairs with what I called plastic and other people called mesh, there will be a significant incidence of postoperative pain, making this a significant public health problem, with all of the accompanying legal battles, trials, workers’ compensation, and so on, if there is such a thing as inguinodynia; however, I have seen several patients I suspected of malingering, with other surgeons coming to the same conclusion.

So the question is whether inguinodynia exists. If it does, with an occurrence in the range of 10%, as some surgeons have claimed, then one would expect that there is a large loss of the labor force, a great deal of litigation, a field day for attorneys, and high costs to employers if they in fact are paying for inguinodynia and its outcomes.

If inguinodynia exists, what is its incidence? And what does one do with these miserable and occasionally suicidal patients? Suffice it to say that if the case is well established that their lives are ruined, I ask myself why everyone at this point in time is willing to ruin a patient’s life to prevent a recurrence that never seemed too much of a problem to begin with.

A number of surgeons have claimed that there is no such thing as inguinodynia and that this is mostly a result of an attempt to obtain workers’ compensation and stop working. Seeing how these people suffer, I doubt it. What is most interesting are the lengths to which surgeons have gone prevent inguinodynia while arguing that it does not exist. For the most part, these attempts at triple neurectomy represent an effort to prevent something these surgeons will argue in another breath does not exist. Inguinodynia may occur from other causes: osteitis pubis from permanent sutures in the pubic bone, cord entrapment, and sutures catching the cord or the genitofemoral nerve.

When I was trying to determine whether this controversy carried water in preparing for the commentaries on inguinal hernias for the 6th edition of *Mastery of Surgery*, I came upon a number of studies that should be quoted.

### Studies concerning prophylaxis of post–hernia repair pain (inguinodynia)

The reports that have appeared, especially those reporting on randomized prospective trials, are from most countries...
of the Western world. Johner et al,\(^1\) in a report of a systemic literature search, reviews studies involving the excision of the ilioinguinal or iliohypogastric and genitofemoral nerves for an operation that has been reported as having no postoperative pain. In this review, it is the ilioinguinal, iliohypogastric, or genitofemoral nerve that is interrupted. Because the ilioinguinal and iliohypogastric nerves are almost always communicative, the outcome does apparently favor interruption of these nerves, “for chronic post-operative pain is now considered the most frequent and disabling of hernia repair.” This statement is particularly interesting in view of the fact that in the past 2 decades, it has been thought that recurrence was the principal complication that should be avoided.\(^2\)

There do seem to be a profusion of studies, mostly prophylactic, of excising various nerves, including the ilioinguinal, iliohypogastric, and genitofemoral nerves, for a problem that many claim does not exist, as stated by Johner et al,\(^1\) who reviewed a pool of data in which a total of 6,023 abstracts were reviewed. Of these, 4 high-quality randomized controlled trials were identified, and the end points of this study were the pooled mean difference and the degree of pain 6 months postoperatively on a 10-point scale. The evidence collected favored neurectomy to decrease the chance of developing chronic pain. In the abstract, the authors state, “Not surprisingly those individuals undergoing neurectomy were also more likely to develop altered sensation at the same time point.” This was statistically significant. The final conclusion of their study was that planned neurectomy seemed to decrease the incidence of chronic postoperative pain.

Lichtenstein and his successor Parviz Amid,\(^3\) in the 6th edition of Fischer’s Mastery of Surgery, concluded after they recommended preservation of the ilioinguinal, iliohypogastric, and genitofemoral nerves once again, stated in their 2004 report,\(^4,5\) that because they believed that inguinodynia does not exist, preservation of the 3 nerves gave the least disturbance in sensation. On the other hand, another very well known herniotomist, George Wantz\(^6\) of Cornell, recommended intentional nerve division. I noted in my comment on chapter 210 of the 6th edition of Mastery of Surgery that I did not think that simple nerve division was sufficient to prevent inguinodynia, because resection was not carried out, and all 3 nerves communicate. It does appear, however, that in Wantz’s study, there was a significant amount of altered sensation 6 months after surgery and increased touch sensation 6 months after herniorrhaphy. The author concluded that inguinal neurectomy does prevent chronic pain. This conclusion was also reached by Wijsmuller et al\(^7\) in the Netherlands.

A randomized prospective trial was undertaken in Iran by Malekpour et al,\(^8\) who carried out a double-blind, randomized trial of 121 patients undergoing open anterior mesh repair of inguinal hernia at 1 center between April 2005 and June 2006. In half of the patients, the ilioinguinal nerve was excised but not buried, and in the other half it was preserved. Pain and hypoesthesia on postoperative day 1 and at 1, 6, and 12 months after surgery using a visual analogue scale were evaluated. Patients were between 18 and 86 years of age, and 95% were men. After randomization, there were 61 patients in the nerve excision group and 60 in the nerve preservation group. The investigators managed to follow up 100 patients at the end of the first year. Mean scores were 2.2\(±\)0.8 in the nerve excision group and 2.8\(±\)0.7 in the nerve preservation group (\(P > .01\)). Between 6 and 12 months after surgery, a median score of 0 was detected in both groups. After postsurgical day 1, the median scores for hypoesthesia were near 0 in both groups, but 13 patients developed chronic inguinodynia, 10 of who were in the nerve preservation group and presumably 3 in the nerve excision group. Thus, chronic postsurgical inguinodynia was seen in 6% of the nerves in the ilioinguinal excision group and 21% in which nerve preservation occurred.

Although I believe these data, it seems to me that the investigators did not carry out the type of nerve excision I would have in an effort to avoid inguinodynia totally, which is the isolation of all 3 nerves, dissecting it as far back as one can laterally, tying it off with 6-0 Prolene, touching the end of the nerve with phenol and alcohol, and then burying it in the muscle. In all of the studies, this procedure was not carried out in an effort to prevent inguinodynia, and I believe this is why there was inguinodynia in the nerve excision group. In addition, not all 3 nerves were dissected back, tied, and buried in the muscle, which also explains why the incidence of inguinodynia was not zero.

The Dutch in recent years have been very active in randomized prospective trials in which there is a seemingly very efficient apparatus for carrying them out. In 1 report, Loos et al\(^9\) described the nature of the study, and in a second report by the same group,\(^10\) the results were quantitative. In this study, patients completed a questionnaire evaluating their current pain intensity, overall treatment results, and specifically the effects on sexual intercourse–related pain. It appeared that there was a learning curve for neurectomy, which the surgeons who did the procedures experienced over a 5-year period. Fifty-four patients underwent neurectomy over a 5-year period, of whom 91% (n = 45) responded. Of these, 52% claimed to be almost free of pain (good or excellent), 24% reported some relief (they still felt pain over regular intervals), and 24% did not benefit. Sexual intercourse–related pain apparently responded favorably to neurectomy in two-thirds of patients. There appeared to be a steep learning curve in performing the procedure, and poor treatment results also depended on previous perceived pain regimens (\(P = .021\)).

The investigators concluded that a selected operative neurectomy in postherniorrhaphy groin neuralgia provides good long-term relief in most patients. I do not believe that this is entirely true, because the neurectomy was not complete. Moreover, there does not appear to be a desire on the part of some surgeons who carry out inguinal neurectomy to ascend the steep learning curve. When I operate on a patient with inguinodynia, I carry out a complete neurectomy for all 3 nerves (ilioinguinal, iliohypogastric, and genitofemoral),
entering the internal canal to its depth and thereby resecting the crural nerve, which innervates an area medial in the groin crease. If one is unsuccessful in resecting of the genitofemoral nerve or it cannot be found, a laparoscopic approach to the retroperitoneum will enable one to find where it branches at the genitofemoral nerve origin, taking care not to injure the lateral femoral cutaneous nerve, in which case there is a great deal of postoperative pain.

I should also add that in these studies, there was also ilioinguinal and iliohypogastric postoperative pain occurring after Pfannenstiel incisions. The same group from the Netherlands identified 27 women with Pfannenstiel-related neuralgia identified between 2002 and 2007, and a single diagnostic nerve block provided long-term pain relief in 5 patients, which occasionally is true, especially if triamcinolone is included. The 22 remaining patients underwent neurectomy, of which 73% had good to excellent results, 14% moderate, and 13% poor after a 2-year median follow-up period. Successful treatment improved intercourse-related pain in most patients, but lumbosacral radicular syndrome was at least partially eliminated in these patients according to the authors.

Other international studies I have not previously mentioned include 1 from China from the Beijing Shatin Hospital, in which Gong et al compared an open tension-free mesh plug repair, a transabdominal preperitoneal (TAPP) repair, and a total extraperitoneal (TEP) laparoscopic repair for unilateral inguinal hernias. This was a randomized prospective trial whose purpose was to compare the Lichtenstein type of technique with 2 laparoscopic techniques commonly used in China (the exact technique is not yet settled in China according to the authors) in which 164 male patients with primary unilateral inguinal hernias were randomized to undergo open operations with mesh plug and patch very similar to the technique originally described by Dr Gilbert and Dr Young or the laparoscopic technique (TAPP) (n = 55), and 50 underwent TEP. Follow-up was 16 months and complete. The open repair was significantly shorter in duration, whereas the authors stated that it was not of tremendous significance, although there was a slight difference in the open technique. The open tension-free mesh plug repair required 66 minutes, the TAPP group took 76 minutes, and the TEP group took 79 minutes; the latter 2 were laparoscopic. Pain scores, however, in the open repair group were significantly higher than the in other 2 groups (P > .01), and recovery time was significantly longer in this open repair group. Recurrences were absent. Three of 62 patients (4.8%) in the open mesh repair had pain, the rate of infection was 3.2%, and there were no infections in the other group. Mesh evaluation scores and pain were assessed after 24 hours, and at 1 week, the score was 1.5 ± .9% compared with .3 ± .5% in the TAPP group and in the TEP group. Although the authors stated that the result was statistically significant, I question the statistics. What they do suggest is that the 2 laparoscopic techniques were superior to the open plug mesh technique in terms of postoperative pain.

Not surprisingly, our surgical brethren in the United Kingdom have reported a number of randomized prospective trials. Bhattarcharjee et al operated on 200 consecutive, unselected men who underwent hernia repair in 2002 (n = 89) and in 2004 (n = 111). A questionnaire was the method of follow-up but was not complete. Fifty-seven percent of those operated on in 2002 and 78% of those operated on in 2004 replied. The patients were not called back or examined after surgery and study. The results were significant; groin discomfort (not evaluated for frequency) was described by 3 (6%) and 4 (5%) patients, respectively, in 2002 and 2004. Only 4 patients (3%) said that their symptoms restricted their daily activities. Thirteen patients had inguinal surgery on the other side, and 105 of 106 respondents would undergo a similar future procedure on the opposite side. Interestingly, this included all but 1 of the patients who had pain after the hernioplasty. The authors concluded that a modified “plug and patch with a well dissected procedure was associated with minimal chronic groin symptoms 5 to 7 years later.”

There are numerous other studies that seem to suggest a slightly greater incidence of serious postoperative pain compared with an open Lichtenstein type of technique or various plugs and patches. Suffice it to say, whatever the incidence, there is a small but significant group of patients who undergo a mesh repair who are seriously inconvenienced by the amount of pain in both the near and remote postoperative periods.

**Should we persist with the Lichtenstein repair?**

By “Lichtenstein repair,” I mean a mesh repair carried out open or laparoscopically in which a significant number of patients report significant pain. Because I see these patients frequently, a significant amount of pain is significant pain indeed. Quite frankly, I fail to see what we have gained by using mesh. On one hand, using the standard transversalis fascia technique done correctly, we have a recurrent incidence of probably 4% to 6%; however, these patients are not inconvenienced by significant pain that keeps them up at night and prevents them from walking, working, and going about their daily activities. A recurrence rate of 6%, at the most, seems to be a small price to pay for freedom from chronic, debilitating pain which interferes with one’s life, relationships, and ability to work and may contribute to suicide.

I will readily accept that if we were to issue a dictum now that all men with inguinal herniorrhaphy had to undergo a transversalis type of repair, paying attention to the conjoined tendon and Poupart’s ligament, most surgeons would not know what we were talking about. The ability to carry out this hernia repair has disappeared from our residency programs. Yet it does seem to me it is not a difficult procedure to learn, and although the recurrence may be higher than with the Lichtenstein or plug-and-patch
or similar repairs, it has the advantage of rarely resulting in chronic debilitating pain. To me, it would be better if all mesh repairs were abandoned and we proceed to teach an old-fashioned transversalis fascia repair for both direct and indirect inguinal hernias. In the event of femoral hernias, one would have to exhume a surgeon who knew how to do a Cooper’s ligament repair, and I think I could manage to recall how one carries out a Cooper ligament repair; however, given the misery I have seen in a number of patients in whom I have carried out triple neurectomies, with results of approximately 80% of reasonable relief of pain, trying my best to eliminate those who wish to obtained workers’ compensation, there is no question in my mind that patients will be better off if we abandon mesh repairs with or without neurectomy and return to an old-fashioned transversalis type of repair, taking care to reef up the transversalis, and to doing a careful repair of the conjoined tendon and Poupart’s ligament, somewhat along the lines of the Shouldice Hospital repair.

I know many readers will scoff, but there is now a considerable body of patients, numbering in the thousands, who report inguinodynia to a US Food and Drug Administration (FDA) database, and it is only increasing. I believe that the FDA has held its first meeting on this issue, with a database of 13,600 patients. I was invited, on short notice, but had a conflict. The inguinodynia database that the companies allegedly collect is imperfect, and companies keep asking for the piece of mesh that was removed from the hernia site, examining it for defects. I think this is a sham. It is not a deficit in the mesh that gets these patients into trouble, it is the inflammatory response of the 3 nerves to whatever kind of mesh is inserted, and adherence to the mesh and/or the inflammation around the mesh is what causes the inguinodynia, which I think is a miserable disease.

Even if we recognize the existence of inguinodynia, how do we deal with it? The traditional way surgery has dealt with issues such as this is with carefully, prospectively designed, randomized trials.

Given the societal cost, it is not unreasonable to suggest that because the FDA is aware of the growing problem, perhaps the FDA should provide funding for a rigorous blinded prospective trial. Five percent of men will undergo inguinal hernia repair, and even if only 5% of these have inguinodynia, it becomes a huge public health problem. With its existing database, the FDA is the logical party to support the study.

I know that what I have stated will create controversy, but I am accustomed to that. I think, given the public health problem, that the insertion of mesh without the protection of the ilioinguinal, iliohypogastric, and genitofemoral nerves leads to inguinodynia, severe pain and incapacitation. (I am not certain it is possible to retain the fascia envelope, as suggested by Amid, to prevent adherent inflammation.) Recurrence of a hernia is not the most terrible thing in the world. It can be repaired. But patients are not miserable and do not take narcotics, they can go about their ordinary business, and the pain is relieved by simple medications, and if it is not tolerated, these patients can undergo repair of the reoccurrence. It is time that we stop creating inguinodynia in inguinal herniorrhaphy. The public health problem of herniorrhaphy in 5% of the adult male population in this country undergoing mesh repairs will sooner or later create an enormous problem.

References