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Bassini inguinal hernia repair: Obsolete or still a viable surgical option? A single center cohort study

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ABSTRACT

Background: Most inguinal hernias are presently repaired using some type of mesh technique. This mesh can be placed through an inguinal incision or positioned through a laparoscopic approach. Either way, results have been impressive including a low recurrence rate, minimal pain and a rapid return to work and normal activity compared to tissue based approaches. Notwithstanding these results, there is still a subset of patients who, for various reasons, are strongly opposed to having a mesh repair. This study summarizes our 13 year experience with such patients and why the Bassini hernia repair is a viable surgical option in these individuals.

Methods: Patients undergoing a Bassini repair at our institution from 2006 to 2014 were analyzed for long-term durability of the repair, complications and recurrence rate.

Results: Of 203 patients studied (average age 65; 99% male), 205 repairs (two patients had bilateral repairs) were evaluated. Seven documented recurrences (3.7%) were identified. Post-operative complications were relatively minor and easily managed. They included 22 patients (10.8%) with a wound hematoma/seroma, 17 (8.4%) with urinary retention, and four (2%) with testicular ischemia not requiring orchiectomy. Pain problems (10.3%) were generally transient and resolved in a period of weeks. In those patients who did not die from co-morbid disease, long term durability of repair (≥ 5 years) was quite common.

Conclusion: Low recurrence rate, long term durability and relatively minor complications indicate that the Bassini repair is still a good surgical option in patients opposed to a mesh repair. As such, we argue that it is not obsolete but still remains a viable surgical option in selected patients.

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1. Introduction

Inguinal hernias have been recognized from the dawn of recorded history, with the earliest documented accounts dating back to the Egyptian Ebers Papyrus description of “a swelling that comes out during coughing [1].” From the beginning, management of inguinal hernias has been an evolving topic of hot debates due in large part to discovery of anatomic details influencing repair, introduction of synthetic polymers, and the advent of laparoscopic surgery. Originating in the 1880s, the Bassini technique has long been regarded as the first efficient inguinal hernia repair technique

[2,3]. Edoardo Bassini’s method employs the transversalis fascia as the primary containment mechanism in the reconstruction of the posterior inguinal canal. The technique involves suturing the transversalis fascia and conjoint tendon to the inguinal ligament behind the spermatic cord, and is frequently coupled with a Tanner slide (vertical relaxing incision in the anterior rectus sheath) in order to prevent tension [4].

Although the Bassini technique played a prominent role in the repair of inguinal hernias throughout much of the 20th century, the introduction of mesh to achieve “tension free” repair of hernias, as well as the advent of laparoscopic surgery to enable repairs using

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minimally invasive methodology, has diminished enthusiasm for direct tissue repairs such as the Bassini approach in recent years. Further, using these new approaches, various randomized controlled trials have demonstrated significant advantages with mesh and/or laparoscopic techniques for hernia repair in terms of less pain, diminished analgesic use, earlier resumption of activities, and overall recurrence rates [5]. Because of these results, some surgeons have voiced the opinion that mesh repair is the “state of the art” in modern hernia surgery, whether employed through an open inguinal incision or positioned laparoscopically, and tissue repairs are only of historical interest [6].

Notwithstanding the accepted advantages of these new approaches to inguinal hernia repair, there are still some patients who prefer not to have mesh used to repair their hernias and are more comfortable having their own tissues used instead. The reason for this is not always clearly stated. It may be as simple as a friend or relative had a tissue repair for their inguinal hernia and did well; thus, they would like the same thing done for themselves. In others, strong feelings have been expressed ranging from an acquaintance who had a hernia repaired with mesh and didn't do well, to a compelling commercial on TV from some law firm stating that mesh repairs were bad, to the notion that a foreign substance used to fix something in one's body should be resisted if it can be corrected by some other means. We have even occasionally encountered patients who were so convinced that mesh is harmful that they refused to give permission for a hernia repair unless their own tissues were used. In this context, is the Bassini tissue repair still a viable surgical option? The present study evaluated the use of this technique over a 13 year period in patients opposed to a mesh repair at our Veterans Affairs Medical Center.

2. Materials and methods

2.1. Surgical cohort

After obtaining approval from our Institutional Review Board (IRB) to conduct this study, we commenced reviewing patient charts from the electronic medical record of the Department of Veterans Affairs, known as the Computerized Patient Record System (CPRS). We downloaded records of all patients who underwent inguinal hernia repairs from January 2006 through December 2014 to identify those who received the Bassini technique. In so doing, we identified a total of 203 patients which became the corpus of our study. This timeframe was chosen so that we could have an adequate period of time to assess the durability of this procedure, the number of recurrences, the types of complications, and any other issues of importance with respect to repairing a hernia. Such follow up continued until the end of December 2019. Thus, patients receiving their repairs in 2006 could conceivably be followed for as long as 12–13 years, while those performed in 2014 would be followed for a minimum of 5 years, enabling a long term assessment of the durability of this technique, which most hernia studies have not provided.

Because this study was a retrospective analysis of patients who had their inguinal hernias repaired using the Bassini technique, the institutional review board waived the need for a written informed consent from the patients subjected to this procedure. Thus, throughout the collection of data, great care was undertaken to maintain patient confidentiality. All data reported in this paper is done in such a fashion so that patients are de-identified. The key outcomes that our study addressed included durability of the repair, complications resulting from the repair, and the incidence of hernia recurrence.

In addition to being approved by the IRB (Record #02331) of our Veterans Facility, this study was also approved by and registered

with www.clinicaltrials.gov (Registration #NCT04888078). The work detailed in this paper has been reported in line with the STROCSS criteria [7].

2.2. Surgical procedure

The actual hernia repair performed utilized the basic approach originally described by Bassini himself in 1889 [2,3]. This involved identifying the hernia defect, ligating the indirect sac if it had a narrow neck (or reducing it if it was a direct or a sliding hernia), and then repairing the defect by suturing the conjoined tendon to the shelving edge of the Poupart's ligament (i.e. inguinal ligament). The type of suture material used was left up to the discretion of the attending surgeon, but was always non-absorbable, and usually “0” in thickness. The repair generally took from 5 to 6 sutures, placed in an interrupted fashion starting at the pubic tubercle and continuing up to the internal ring, leaving an opening for the cord. Generous bites of both the inguinal ligament and conjoined tendon were routine. Relaxing incisions were left up to the choice of the attending surgeon and based on whether she/he felt the repair was under too much tension.

2.3. Data Analysis

The present study is a single center cohort series evaluating the Bassini inguinal hernia repair over a 13 year period. Since no attempt is made to compare this surgical technique with another approach to repairing an inguinal hernia, all calculations involve the cohort of patients receiving this type of repair and the results experienced from using it. Thus, we employed simple mathematical expressions to analyze our results such as the calculation of means \pm SEM where appropriate, and percentages of the various parameters measured. The SPSS® V.25 statistical software was used to derive these calculations.

3. Results

The operative report on each patient was carefully reviewed to ensure that the 203 patients selected for analysis did indeed have Bassini hernia repairs. At the very least, the technique used had to state without question that the conjoined tendon was sutured to the shelving edge of Poupart's ligament (inguinal ligament) to repair the hernia, that no mesh was used, and that no other structures (such as Cooper's ligament) were employed as additional components of the repair. All operative reports met these criteria and thus confirmed that the respective patients were suitable for study. In two patients, two Bassini repairs were performed, one on the right side followed by a second on the left side when a new hernia developed on that side several years later. Thus, this study is actually comprised of a total of 205 Bassini hernia repairs. The average age of the patients enrolled in this study was 65 ± 12 years, with a range from the mid-thirties to the high eighties. Ninety-nine percent were males.

3.1. Post-operative complications and deaths

Overall, complications were relatively minor and easily managed. Looking at all patients as a total cohort, twenty-two patients (10.8%) developed a post-operative hematoma/seroma at the incision site. This problem was generally not observed until the first outpatient visit two weeks following surgery; sometimes the patient was concerned enough about a post-operative swelling in the inguinal region that it prompted a visit to our emergency department for evaluation. In either case, supportive care and reassurance

was all that was needed for management in most patients and by one month post-operation, the problem had usually resolved.

Two patients followed a somewhat different course. One came to the emergency room four days after having his hernia repaired because of a low grade fever and erythema involving his incision which extended into the adjacent flank. The incision was opened but no drainage or purulence was noted. He was started on antibiotics, the incision packed, and he was instructed to be followed up in the outpatient clinic several days later. At that time, serous-like drainage was noted, but again no evidence of definite infection. The patient was continued on his antibiotics, along with serial wound packing and evaluation for the next few weeks. By one month following surgery the wound was totally healed. The second patient had undergone a hernia repair for a large chronic incarcerated hernia with extension of the sac into the mid-scrotum. The dissection was tedious, but the sac was ultimately freed up and ligated and its contents returned to the abdomen; the hernia itself was then successfully repaired without difficulty. Over the first 24 h following operation, a large scrotal hematoma formed that initially remained stable. By one week postoperatively, a portion of the scrotal skin broke down with a resultant purulent discharge. This area was opened, irrigated and packed in the outpatient setting and the patient started on antibiotics. As with the other patient, several follow-up visits and packing over the next few weeks resulted in excellent healing by secondary intention and the wound was totally healed in about 5 weeks.

Seventeen patients (8.4%) developed post-operative urinary retention. With few exceptions, this was identified in the post-op recovery area. Most of the time it could be managed by watchful waiting, resulting in the patient being observed for several hours until urination occurred, following which the patient was discharged home. Less commonly, the patient required catheterization and was kept in the hospital overnight to ensure that adequate urination had occurred the next morning upon removing the catheter and prior to discharge. Rarely, a catheter was needed to remain in place for several days to a week to regain urinary function. In this circumstance, the patient would be sent home a day or two after surgery and followed by the urology service. Patients experiencing this latter situation generally were found to have prostatic enlargement that almost always responded to non-operative management. Four patients (2.0%) experienced testicular ischemia identified on ultrasound of the testicle, but none required orchiectomy.

Some 10.3% of patients developed persistent pain in the inguinal region after operation that was still present two weeks post-surgery. With acetaminophen or NSAID treatment, this problem was usually resolved by one to three months after operation. Two patients, unfortunately, had a much more protracted pain course that persisted for several years rather than just a few months. In both instances, the patients complained of lingering pain in the groin that required persistent over the counter analgesics to control, and occasionally pain killing injections. Each patient was offered the opportunity to be seen by a pain specialist to perform nerve mapping in an effort to identify the specific nerve involved with the ultimate goal of ablating it. For various reasons, both patients declined this approach, and preferred intermittent pain medications as needed. The chronicity of the pain problem persisted for 2 ½ years in one patient and more than four years in another until it sufficiently subsided that it was no longer considered a problem.

Of the 203 patients in this study, some 57 patients died at various times following their repairs of diseases unrelated to the hernia repair, such as cancer or cardiovascular problems. Many of these patients lived for a considerable number of years after operation, some as long as a decade or more. One patient died at

home three weeks following repair. Available evidence suggested a cardiac death.

3.2. Recurrent hernia

A total of nine recurrences were identified in this study. Five of these recurrences had re-operative surgery and re-repair. In two circumstances, the patient chose not to have the hernia re-repaired. One patient felt that the symptoms resulting from the recurrence were sufficiently mild and infrequent that he could manage them with over the counter medications. The other patient was managed with a truss with generally good success until his death from cardiac disease three years later.

Two of the nine patients developed what were “called recurrences”, although some would disagree. One of these patients noted a soft tissue mass in his groin some 5 years subsequent to his initial hernia repair. After following this patient nonoperatively for 8–9 months, the evaluating surgeon felt this was a recurrence and recommended inguinal exploration. At operation, no hernia was found, and the original repair was noted to be totally intact. The soft tissue mass was identified as a cord lipoma and resected. For reasons unclear, this operating surgeon placed an onlay patch of mesh over the original repair to “secure it” even though he stated in his operative note that no recurrence was present. The other patient developed an incarcerated femoral hernia on the same side in which a Bassini repair had been performed some two years previously. At operation, the Bassini repair was noted to be intact with no evidence of recurrence. The femoral hernia had entrapped necrotic small bowel that required resection but was repaired without disruption of the Bassini repair. The patient has had no further difficulties. Although we are including these latter two situations as “recurrences”, we believe it's a grey area in which many surgeons would be hesitant to call recurrences.

Our recurrence information is summarized in [Table 1](#). Although a total of 205 Bassini repairs were performed in this study, seventeen were not available for long term assessment because the patients were lost to long term follow up for various reasons. Although there was no evidence of any hernia recurrence in any of these seventeen patients at the last time they were seen, it seemed inappropriate to include them in our recurrence calculations due to this lack of follow up. Accordingly, all recurrence calculations are based on a denominator of 188. Thus, if one includes all 9 patients in [Table 1](#) as having recurrences, the overall recurrence rate is 4.8%. If 7 recurrences is considered more accurate, as we contend, the recurrence rate is 3.7%.

3.3. Durability of repair

Durability of repair is an important component in assessing how good a particular hernia repair really is and was one of the goals of this study. Our definition of durability is “the ability to last over a long period of time without becoming disrupted.” To make this determination in the patients being studied, each patient with a Bassini repair was tracked from the time of the operation for as long as was possible. It was our belief that a minimum of 5 years' durability would support the notion that a Bassini repair was indeed a strong repair. Thus, we followed patients when possible to the end of 2019. This would enable patients who had their hernias repaired in 2014 to be assessed for a minimum of 5 years. Those whose hernias were repaired earlier could be followed for longer periods using this endpoint. As an example, for those patients receiving a Bassini repair in 2006, follow up could conceivably extend for a period of some 13 years if they had not died, been lost to follow up, or had developed a recurrence.

Table 1
Recurrences after original Bassini hernia repair.

Definite Recurrences				
Original Bassini Repair	Suspected Recurrence	Clinical Presentation	Management	Findings
10/2006 (right) Patient 1	9/2007	Reducible inguinal bulge with intermittent pain	Laparoscopic exploration with mesh placement in 11/2007	Enlarged internal ring with reducible hernia sac
1/2008 (right) Patient 2	6/2012	Small reducible inguinal bulge; virtually asymptomatic	Patient wanted nothing done	N/A
8/2009 (left) Patient 3	3/2010	Moderate symptomatic inguinal bulge	Laparoscopic exploration identifying bilateral direct hernias repaired with mesh in 6/2010	Both right and left direct hernias; enlarged internal ring on left
3/2011 (left) Patient 4	10/2012	Small reducible inguinal bulge; occasionally symptomatic	Managed with truss; patient died of cardio-vascular disease in 10/2015	N/A
4/2011 (right) Patient 5	11/2012	Painful moderate size inguinal bulge	Open inguinal Cooper's ligament repair in 12/2012; two years later this repair broke down requiring a laparoscopic repair with mesh	Moderate size direct hernia
2/2013 (left) Patient 6	9/2016	Moderate size inguinal bulge with bowel sounds and occasional pain	Laparoscopic exploration with mesh placement in 1/2017	Moderate size direct hernia with indirect component
3/2013 (right) Patient 7	6/2015	Started out as a small bulge in inguinal region that got considerably larger and more painful over subsequent 6 months	Open mesh repair in 2/2016	Moderate size direct hernia
Questionable Recurrences				
Original Bassini Repair	Suspected Recurrence	Clinical Presentation	Management	Findings
10/2012 (right) Patient 8	4/2018	Soft essentially painless non-tender mass at external ring; after follow up for some 8–9 months, it started becoming mildly painful	Open inguinal exploration; mass identified as lipoma of cord; mesh placed over previous repair and to tighten internal ring in 2/2019	Lipoma of cord; Bassini repair intact; no definite hernia found
2/2013 (left) Patient 9	6/2015	Patient presented emergently with incarcerated femoral hernia	Open inguinal exploration demonstrating an incarcerated femoral hernia that was repaired in 6/2015	Intact Bassini repair; necrotic small bowel resected that was trapped in the femoral hernia

A total of 142 patients were able to be tracked for at least five years and in many instances much longer. These included a combination of those patients who have remained alive since the time of their original repair, as well as those deceased patients who lived at least five years after their repairs. Of the remaining patients, 35 died prior to reaching the five year mark, and another 17 patients have been lost to follow up for various reasons as stated previously. This durability information is shown in [Table 2](#).

4. Discussion

Inguinal hernia repair is one of the most commonly performed elective operations in general surgery. It has been estimated that as many as 800,000 of these operations take place annually in the United States [8]. While the standard for inguinal hernia repair for much of the 20th century involved the use of the patient's own tissues (Bassini, McVay or Shouldice), new developments in hernia management have evolved in the last thirty years. The tension-free mesh repair, developed by Lichtenstein in the 1970s, has become the "most common open technique" for most hernia surgeons [9]. With the development and ever increasing use of minimally invasive techniques in recent decades, laparoscopic approaches to

inguinal hernia repair have become ever more refined and popular [10]. Thus, it is not surprising that some surgeons have expressed the opinion that tissue repairs are of historical interest only and should no longer have a significant role in 21st century hernia surgery [6].

Is this notion necessarily valid? If one assesses these modern techniques in terms of their ability to get patients back to work sooner or enjoying full activity more quickly, then the answer is yes. These newer techniques can usually meet these expectations within at most a week to 10 days of reduced activity. Tissue repairs may require a month to 6 weeks before these expectations are reached. But what about the patient who is retired or no longer has major work obligations and isn't concerned about these issues but is more concerned about having a foreign substance in his/her body? Should he/she be talked into one of these newer repairs? Many contemporary general surgeons would respond yes, because the recurrence rates are touted to be so much lower than those employing the patient's own tissues. But is that contention true? While Lichtenstein and his group have clearly been able to achieve incredibly low recurrence rates (0.1%) with their open mesh technique [9,11], this has not been the uniform experience of many others using this approach. In various population based studies

Table 2
LONG-TERM durability of Bassini inguinal hernia repair.

Years with intact repair	Duration in months post-repair	Number of Patients
5 Years	60 (1); 60.5 (1); 61 (1); 61.5 (1); 62 (2); 62.5(1); 63 (2); 63.5 (1); 64 (1); 66.5 (2); 67 (2); 68 (1); 68.5 (1); 69 (2); 70 (3); 70.5 (1); 71 (2)	25 Patients
6 Years	73 (2); 74 (1); 75 (1); 77 (1); 77.5 (1); 78.5 (2);79 (1); 80 (1); 81 (2); 82 (1); 83 (2)	15 Patients
7 Years	84 (3); 84.5 (3); 85 (2); 85.5 (1); 86 (1); 87 (2); 88 (1); 89 (2); 89.5 (1); 90.5 (1); 91 (3); 92 (3); 92.5 (1); 93 (6); 93.5 (1); 94 (2); 94.5 (2); 95 (3); 95.5 (3)	41 Patients
8 Years	96 (1); 97 (1); 97.5 (1); 98 (1); 98.5 (2); 99 (1); 99.5 (1); 100 (2); 101 (2); 101.5 (1); 102 (3); 102.5 (1); 103 (4); 103.5 (1); 104 (3); 105 (1); 105.5 (1); 106 (3); 106.5 (1)	31 Patients
9 Years	108 (1); 109(2); 109.5 (1); 112 (3); 112.5 (1); 113 (1); 114 (1); 116 (1)	11 Patients
10 Years	120 (1); 120.5 (1); 121.5 (1); 122 (2); 123 (1); 125.5 (1); 126 (1)	8 Patients
11 Years	132.5 (1); 135 (1); 136 (1); 139.5 (1); 141 (1); 142 (1)	6 Patients
12 Years	144 (1); 145 (1)	2 Patients
13 Years	158 (1); 160.5 (1); 163 (1)	3 Patients

() = number of patients Total = 142 patients.

from Scotland, Canada (Ontario) and Poland using the Lichtenstein mesh technique, recurrence rates have ranged from 1.8% to 2.2% [12–14]. In a multicenter Veterans Affairs Study using the experience obtained at 14 VA Hospitals, the overall recurrence rate using the Lichtenstein approach was 4.9% [15]. A similar range of results has been reported when laparoscopic approaches were used to repair inguinal hernias ranging from a low of 3.4% to a high of 10.1% [12–15]. On balance, mesh repairs, while impressive, are not as perfect as often advertised. Thus, the 3.7% to 4.8% recurrence rate that we observed using the tissue based Bassini repair (see Table 1) remains respectable and quite acceptable for those patients who eschew mesh or who have serious concerns about mesh placement to repair their hernia whether positioned through an open approach or using a minimally invasive technique.

As shown in this study, long term durability can be achieved in most patients undergoing the Bassini repair. For those patients who had their repairs in 2006, when the study commenced, it was not unusual for the repair to be intact 12–13 years later. At minimum, 5 years of durability was quite commonplace as demonstrated by the group of patients who had their repairs in 2014 and were followed through 2019. (see Table 2). What this means is that if this repair is carried out using the principles originally described by Edoardo Bassini [2,3] a sustainable, long term result can be expected.

While most surgeons (including ourselves) would agree that mesh is the standard for modern inguinal hernia repair whether placed through an external inguinal incision or positioned internally using a laparoscopic technique, our findings clearly show that a strong, durable repair can still be achieved using a patient's own tissues with the Bassini technique. As shown in Table 2, depending on when the hernia was repaired, this durability can range from five to as long as 13 years. To our knowledge, such long-term durability has not been previously reported with the Bassini approach, and for that matter is not commonly reported with most mesh repairs. Of further note, the complications associated with the Bassini repair were minimal overall and easily managed.

One criticism of the Bassini repair over the years has been an alleged recurrence rate as high as 12.8 to 33% [16–18]. Precisely why the recurrence has been so high in these previously published reports is unknown, but we believe that attention to anatomic detail and ensuring that adequate tissue bites are taken when

suturing the conjoined tendon to the inguinal ligament can greatly lessen the likelihood of recurrence. Our low recurrence rate of 3.7%–4.8% supports that contention. We further believe that the laxity of the rebuilt internal inguinal ring observed in some of our patients with hernia recurrence could conceivably be diminished even more by making sure that the ring is sufficiently tight to prevent recurrence but still allowing adequate room for blood vessels traversing it without compromising flow to the testicle.

The major downside of the Bassini repair is the necessity to avoid excess tension on the inguinal region while it is healing. This means that excessive pulling on the muscles of the region, as would occur with lifting, should be greatly minimized. As such, lifting more than 10–15 lbs. is forbidden for 6 weeks after the repair. Accordingly, patients with manual jobs cannot resume full work until the 6 week period has elapsed. Surgeons who perform mesh repairs generally do not impose these restrictions enabling the patient to return to his/her employment within a week or two of the repair. Hence, the popularity of mesh repairs.

The title of this paper raises the important question of whether the Bassini hernia repair is obsolete or still has a role in the 21st century. We believe that it still has an important role. As noted among our patients receiving this repair, some individuals simply do not want the placement of a foreign substance (i.e. mesh) in their body and adamantly prefer that their own tissues be used to perform the hernia repair. When we encounter that situation, we almost always honor that request and proceed with the tissue repair. Second, even under the best of circumstances, mesh does not always give the “so called” perfect result anticipated. Its use is also associated with recurrent hernia, albeit small, and may require an open tissue technique or laparoscopic approach to adequately repair the recurrent hernia. We have encountered this on a number of occasions, not only when the mesh has been employed for an open procedure, such as the Lichtenstein method, but also when the mesh has been placed laparoscopically. The Bassini approach can be quite useful for this re-repair. Third, the mesh may have become infected, as occurs sometimes when used in an open procedure, necessitating its removal to eradicate the infection. When this happens, the Bassini repair can again be used to repair the inguinal floor. Fourth, at our institution, and we are told at most, that when a kidney transplant is anticipated and a patient develops

an inguinal hernia, any type of mesh repair is contraindicated. This is because of the foreign body induced infection/seroma risk and poor wound healing that can be associated with mesh in the immune compromised patient, as well as the crumpled and balled up effect induced by mesh in the inguinal canal that can adversely limit access to the transplant fossa and the performance of a successful transplant [19,20]. Accordingly, our transplant surgeons use the Bassini repair to fix such hernias. Five, in this age of Global Healthcare, more and more surgeons are offering their time and skills to participate in short term medical mission projects in developing countries. In many, mesh products and laparoscopic technology are not available to repair hernias. Thus, a tissue type approach is virtually always needed to carry out an inguinal hernia repair; the Bassini repair is a good option. Finally, the open tissue technique is an excellent means of teaching the anatomy of the inguinal region that is not as easily seen when simply placing mesh in an open repair. Good surgical training requires that the surgeon have the breadth of training to handle a wide variety of surgical situations where mesh utilization would be inadvisable (e.g. strangulated small bowel obstruction). This requires facility and skill with a wide assortment of surgical options. For all these reasons, we contend that the Bassini technique is not obsolete and should not be assigned to “the junk pile” of surgical history. All surgeons repairing inguinal hernias should know how to perform it, for it may be needed sooner than one may think.

5. Conclusion

The present study has clearly shown that the Bassini tissue-based technique can be an acceptable option for inguinal hernia repair in that subset of patients who, for whatever reason, do not wish or should not have mesh to be a part of this repair. No intent is meant to downplay the important role that mesh has been shown to play in modern hernia surgery over the past 30 years whether used in an open fashion or placed laparoscopically. We have used these approaches ourselves and have found them to be very effective in managing most inguinal hernias. Nonetheless, we would argue that tissue based repairs should still be a component of the modern surgeon's “toolbox” as there will be situations, even though uncommon, where their use will be more prudent and occasionally more ideal than their mesh counterpart. As such, we argue that the Bassini repair is not obsolete but still remains a viable surgical option in selected patients.

Declaration of competing interest

There were no conflicts of interest involving any authors of this paper.

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This is to confirm that all authors have viewed this manuscript and the data presented and have agreed to its submission for publication.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.ijso.2021.100415>.

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Ethical approval

Since this study was a retrospective chart review of patients (de-identified) who had undergone previous Bassini inguinal hernia repairs, no ethical issues were raised that needed approval.

Consent

Because this is a retrospective review in which patients were all de-identified, our Institutional Review Board did not require patient consent to proceed with this research and ultimately have the results published.

Author contribution

Study design: Tse, Maher, Rivers, Miller.
Data Collection: Tse, Johns, Miller.
Data Analysis: Tse, Johns, Maher, Rivers, Miller.
Writing: Tse, Maher, Miller.
Final manuscript preparation: Maher, Rivers, Miller.

Registration of research studies

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References

- [1] The Egyptian Papyrus of Ebers (1552 B.C.): reference number Ebers 864.
- [2] Bassini E. Nuovo metodo operativo per la cura dell'ernia inguinale. Padova, Italy: Prosperini; 1889.
- [3] Andrews EW. Major and minor technique of Bassini's operation, as performed by himself. *Med Record* 1899;56:622–4.
- [4] Tanner NC. A slide operation for inguinal and femoral hernia. *Br J Surg* 1942;29:285–7.
- [5] Matthes RD, Neumayer L. Inguinal hernia in the 21st century: an evidence-based review. *Curr Probl Surg* 2008;45(4):261–312.
- [6] Campanelli G, Canziani M, Frattini F, Cavalli M, Agrusti S. Inguinal hernia: state of the art. *Int J Surg* 2008;6:S26–8.
- [7] Agha R, Abdall-Razak A, Crossley E, Dowlut N, Iosifidis C, Mathew G, et al. The STROCSS 2019 guideline: strengthening the reporting of cohort studies in surgery. *Inter. J. Surg* 2019;72:156–65.

- [8] Rutkow IM. Demographic and socioeconomic aspects of hernia repair in the United States in 2003. *Surg Clin N Am* 2003;83(5):1045–51. v-vi.
- [9] Lichtenstein IL, Shulman AG, Amid PK, Montilior MM. The tension-free hernioplasty. *Am J Surg* 1989;157:188–93.
- [10] Wauschkuhn CA, Schwarz J, Boekeler U, Bittner R. Laparoscopic inguinal hernia repair: gold standard in bilateral hernia repair? Results of more than 2800 patients in comparison to literature. *Surg Endosc* 2010;24(12):3026–30.
- [11] Amid PK, Shulman AG, Lichtenstein IL. Open “tension-free” repair of inguinal hernias: the Lichtenstein technique. *Eur J Surg* 1996;162:447–53.
- [12] Ramjist JK, Dossa F, Stukel TA, Urbach DR, Fu L, Baxter NN. Reoperation for inguinal hernia recurrence in Ontario: a population-based study. *Hernia* 2019;23:647–54.
- [13] Ramsay G, Scott NW, Jansen JO. A 19 year population-based cohort study analyzing reoperation for recurrence following laparoscopic and open inguinal hernia repairs. *Hernia* 2019. <https://doi.org/10.1007/s10029-019-02073-w> (November 30).
- [14] Mltura K, Garnysz K, Michalek I. Long-term follow-up of a randomized controlled trial of Lichtenstein repair vs the Valenti technique for inguinal hernia. *Hernia* 2019;23:547–54.
- [15] Neumayer L, Giobbie-Hurder A, Jonasson O, et al. Open mesh versus laparoscopic mesh repair of inguinal hernia. *N Engl J Med* 2004;350:1819–27.
- [16] Kux M, Fuchsjäger N, Schemper M. Shouldice is superior to Bassini inguinal herniorrhaphy. *Am J Surg* 1994;168(1):15–8.
- [17] Beets GL, Oosterhais KJ, Go PM, Baeten CG, Kootstra G. Long term follow-up (12–15 years) of a randomized controlled trial comparing Bassini-Stetten, Shouldice, and high ligation with narrowing of the internal ring for primary inguinal hernia repair. *J Am Coll Surg* 1997;185(4):352–7.
- [18] Muckter H, Reuters G, Vogel W. Bassini and Shouldice repair of inguinal hernia. A retrospective comparative study. *Chirurg* 1994;65(2):121–6.
- [19] Nadalin S, Paul A, Malagó M, et al. Laparoscopic inguinal herniae repair as a potential complicating factor in kidney transplantation. *Transplantation* 2005;79:1767–8.
- [20] Weale AR, Baynham SJ, Pentlow AK, et al. The impact of open mesh repair of inguinal herniae in renal transplantation. *Transplantation* 2007;84:938.