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TRAINING CHALLENGES AND THE COMPLEXITY OF ABDOMINAL WALL SURGERY: INSIGHTS FROM LITERATURE AND THE HERNIAMED REGISTRY

Dr. Gupta M.V.S.N

Assistant Professor, Department of General Surgery, Prathima Relief Institute of Medical Sciences, Nagunur, Karimnagar, Telangana.

ABSTRACT

ACCESS, a program organized by the European Hernia Society (EHS), also acknowledges the emerging requirement of developing specialists in the area of abdominal wall. The rationale for this proposal is the fact that more recent methods of abdominal wall surgery are not as easily controlled as before, more so because the effectiveness varies among patients, hence the need to base the treatment on the type of patient in question. The other one revolves around the use of the internet where patients themselves present the best results of a surgery. But there is scant information and literature regarding the specialization related to abdominal wall surgery or what it involves. A search of the papers was done in May 2019 from Medline, PubMed, Scopus, Embase, Springer Link, and Cochrane library, out of which the authors were able to find 75 papers. Various results obtained from the Herniamed Hernia Registry were compared and percentage of the cases that had an unfavorable influence on ARM like hernia or patient related factors in regard to the inguinal or incisional hernia repair was done. The recent guideline regarding the abdominal wall surgery state that they should be made individualized. This approach takes for granted that the surgeon operating on the patient has the best of the techniques and knowledge and that each of the approaches in inguinal hernia repair (Lichtenstein, TEP, TAPP Shouldice) and the incisional hernia repair (laparoscopic IPOM, open sublay, open IPOM, open onlay, open/endoscopic component separation) have their own learning curve. Other factors that makes an operation complex are emergency operations, obesity, recurrences, bilateral inguinal hernias, hernias in women, scrotal hernias, big hole, high ASA scores, operation age 80 years and above, higher medical risk, and past lower abdominal operations. According to the data of the Herniamed Hernia Registry, 69.7% of the patients had at least one of the above-mentioned characteristics. Training of the general surgeon involves performing between 50-100 hernia operations, of which 25 are laparo-endoscopic. The individualization of care has gradually applied and is more often discussed in hernia surgery and in the current hernia guidelines. Moreover, because it has become more complex to perform an abdominal wall surgery, there are still not many cases that can be handled by the trainees to solve the learning curve that was noted. Consequently, young surgeons should embark on their clinical fellowships for the purpose of obtaining qualifications in abdominal wall surgery as well as improve on their clinical and operative skills while under supervision. Therefore, to upgrade the knowledge of the practicing general surgeons regarding hernia surgery, they should pursue a more comprehensive surgical technique through clinical observation, purposeful clinical workshops, and forums.

Keywords: -Surgical training, Learning curve, Complex hernias, Tailored approach, Inguinal hernia, Incisional hernia.

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INTRODUCTION

In this context, it is evident that both the accreditation and certification programs of the

Corresponding Author: **Dr. Gupta M.V.S.N**

centres and surgeons of ACCESS group from EHS endorse the training for hernia surgeons [1]. The rationale for this to be achieved is found in complexity of the Abdominal wall surgery due to the following; advanced technology, techniques used in surgeries, complicated cases, approach used in handling patients and high health literacy of the public. As will be seen, because of the additions to the complexity of the abdominal wall surgery there is a continuous release of guidelines by the various worldwide hernia societies [2-14]. More efforts are still required in enhancing the knowledge and the richness and dynamism of contemporary AMS in the scientific community. Moreover, it would be useful to reveal particular circumstances, under which the outcomes can deteriorate for individual hernias, as well as to describe more extended operations in this sphere. It overviews development in the technique of the abdominal wall surgery and contains evidence based on the ideal modern approach nowadays [2–14]. These guidelines suggest increased interest in newer and complicated mishmash regarding the abdominal wall surgery, and considering these technical factors shall be a good way of improving on the favorable outcome [2-14]. Still, any surgeon operating in such a manner works with the adapted approach to hernia repair, but it gives the impression that it is no longer enough for a doctor to be an expert in one kind of surgery. Thus, every type of hernia entails the knowledge of many techniques in an attempt to achieve satisfactory results with least amount of morbidity in every patient [2-14]. According to [15], general surgery training is supposed to equip the surgeons to the level of competency that should allow the surgeon to practice independently. Nevertheless, no specific IS to the required operative experience during the general surgical training has been established; Earl et al also highlighted as they suggest that "the requirements for surgical curricula may differ". For instance, in the UK 1,600 procedures are included in the list of training procedures while the number of such procedures in USA is 750. Apart from the main operations like appendectomy, cholecystectomy, and partial colectomy, the remaining procedures include inguinal/femoral Hernia repair, ventral Hernia repair which is also very crucial in the general surgery education [16]. To do so this manuscript intends to first undertake a literature search with the following question; what has made the surgery of the abdominal wall complex? In the case of the aforementioned risk factors, the incidence in AW surgery has also used the Herniamed Registry and its proven applicability [17, 18]. A group decision is then made on whether general surgery training as obtained by surgeons in Europe is sufficient to equip the aforementioned complicated abdominal wall hernias with a view of the ability of the surgeons to operate on such cases on their own in the future.

MATERIALS AND METHODS

In line with the objective of this study, a systematic search was conducted in May 2019 using a specified search terms in databases like, Medline, PubMed, Scopus, Embase, Springer link and Cochrane Library was conducted. Thus, the following keywords were used in the search: surgery, general surgery and training, hernia and complexity, hernia and learning curve, hernia and personalised approach, and hernia<|human|>, and risk factors.

RESULTS

Increasing complexity of abdominal wall surgery

Several publications report several aspects that could potentially influence the results of the AW surgery (Tables 1, 2), which contributes to the complexity of the hernia surgery [19–54]. Nevertheless, there remains no definite definition of what constitutes a 'complex abdominal wall hernia'; only a few have tried to make efforts in this context [24]. Most of the causes of complications in abdominal wall surgery can be attributed to hernias in the groin and incisional hernias notwithstanding they are slight different in some aspects. These factors include: preoperative variables including: individualization of the approach, learning curve, emergency operation, obesity (BMI $\geq$ 30), recurrence, large defect size, gender, American Society of Anaesthesiologists (ASA) classification, age more than 80 years, and other risk factors including; chronic obstructive pulmonary dysfunction (COPD), diabetes, abdominal aortic aneurysm, immunocompromised status, steroids, smoker, coagulopathy, anti-coagulant/antiplatelet therapy.

Tailored approach

Ideally, each guideline is focused on personalized design of the procedure, which should be adjusted to the patient's condition, type of the disease, and preference. This can be interpreted as the awareness that any surgical operation cannot handle all the clinical situations [2–14]. There cannot be any doubt that it would be reasonable to assume that the treating surgeon must be able to do more than one method of the surgery in question. It will be noted that any surgeon for hernia must have acquired enough experience hence be at the or past the learning curve concerning the advised techniques of surgery. In minimising the recurrence rate for inguinal hernia, the surgeon should be able to do at least the Lichtenstein open mesh repair, laparo endoscopic total extraperitoneal patch (TEP), the Laparo, Endoscopic, Transabdominal, Preperitoneal patch (TAPP) as well as the Shouldice repair which does not

necessitate the used of mesh. As for the incisional hernia repair surgery, the specialty of a given method or especially in a part a has to cover a broad part of the technique since incisional hernia surgery involves many types or forms which are well-known. These include the laparoscopic intraperitonealonlay mesh (IPOM), open suture, sublay, onlay, IPOM and component separation [14]. Also, the surgeon should introduce him with the types of mesh that is available in the market, which vary with the capacities of the type of hernia. As with any surgery, there are several complications that are related to each of these surgical procedures and one has to learn the tricks of the trade in order to do these operations Therefore, bar the surgeon who has undergone a particular surgery following the above-mentioned tailored procedure has to demonstrate the performance of several techniques and ensuring that the particular surgery that he or she conducted was done efficiently. This should also come as a concern to all the techniques highlighted in the guidelines. Hence when employing the other view such as in abdominal wall surgery, we find that the task are even more demanding since actual incisions are involved, which inturn put much more pressure/loads on the side of the surgeon.

Learning curve for laparoscopic and open abdominal wall surgery

Other authors have pointed out that laparo-endoscopic surgery require more time to learn than any of the normal standard surgical procedures mainly due to the difficult level of the procedure [19]. For example, when perfecting the TEP technique for inguinal hernia repair it would be necessary to make 250 surgeries, if everything is based on the received outcomes. This is expected to take anything between 50-100 procedures for TAPP to be mastered fully. Concerning the learning curves, those of TEP and TAPP are higher as compared to the techniques of om and nom although the latter two do have specificities with the above-mentioned steep learning curves if not well accomplished would result in increased recurrence rate and/or chronic pain. This review also established that overall, laparoscopic IPOM technique in incisional hernia repair has higher complication rate especially in the equality period of the surgeon's experience and as such, the surgeon should at all times, ensure that they are followed by a qualified surgeon [19]. There is no available data on the anticipated or proposed learning curve for the various approaches in open surgical treatment of incisional hernia. However, it is reasonable to believe that open techniques, such as sublay procedure, open IPOM, and component separation techniques, are learner-critical compared to the inguinal hernia repairs. Therefore, the implementation of a laid down approach that has been described as selective or differentiated but will involve mastery of a number of techniques that are used in dealing with the abdominal wall will put more pressure on a surgeon who is already preoccupied with the foregoing aspects. One must also note that, for an ABW well integrated into the modern concepts and principles of surgical training, the initial training should be done under the supervision of an experienced MBS surgeon instead of an arbitrary approach seen in some general surgery training programs.

Emergency abdominal wall repair

Furthermore, the ruptured hernias have been related to increased mortality and morbidity rates especially when they are repaired in emergent setting [11]. The study conducted in the USA indicated that the mean mortality found to be 3.3%. In more detail, it has been noted that from as early as year 2001, through the year 2010, the emergency hospitalization for hernia has been gradually increasing and from 16.0 per 100000 person-years int eh year 2001, it has reached 19.2 per 100000 person-years. The highest incidence was recorded for males of ≥ 65 years (400, 2001: 50.1–2010: 71.3). Based on the Swedish Hernia Register, regarding the type of surgery that is classified under emergency, it was 5.1% for inguinal hernia and 36.5% for femoral hernia. Concerning emergencies, according to the Danish Hernia Database, the ER of groin hernia was 3.6% [20]. Data from a registry of Herniamed stated that 3.1% of the patients between the age of 15 and 44 years of age had emergency incisional hernia surgery.

Obesity

Adipose tissue is generally taken into consideration to be one of the most important variables that shape the confluence of a complex abdominal wall hernia [24]. "Obesity is associated with additional risks and considerations for the surgeon engaging in abdominal wall reconstruction" [25]. Minimally invasive ventral hernia repair patients, among 55,180 patients in ACS-NSQIP data, contained 61.4% of patients with the unfortunate BMIs of more than 30 kg/m² [26]. Obesity is manifested in a higher BMI and is proven to cause increased risk of surgical and medical complications ($p < 0.0001$) [26]. Among the 102, 191 patients who underwent an OVR, 58.5 % were considered to be obese. When patients were grouped according to their BMI classes, all the BMI classes were found to be significantly associated with an increased rate of all the postoperative complications with $p < 0.0001$, suggesting as patients BMI increases their postoperative complication risk also increases. Out of 46,793 patients who have undergone both laparoscopic and open IHR, 7,346 patients (16.3%) were obese or had a BMI of ≥30 kg/m², based on the ACS-NSQIP data.

Recurrent hernias

Based on the primary Lichtenstein hernia repair and the registry from the laparo-endoscopic as well as the open methods, it has been identified that the recurrent IHR appears to be worse than those for primary IHR. That is why, an emphasis is made on a better understanding of the fact that recurrent inguinal hernias should be operated only with highly qualified surgeons. According to the study, the re-operations within the general studied population of patients with inguinal hernias amount to 11%–13% for the recurrence of inguinal hernias. If there is a first recurrence of inguinal hernia after an anterior repair the best approach would be laparo-endoscopic. the occurrence in the event of failure of posterior repair should be corrected by an open anterior approach but this depends with the competence of the specific surgeon in question [7]. Hernia mesh is mostly used in primary hernia repair techniques; however, in the event where one experiences a recurrence after applying the mesh technology, it is referred to as complex abdominal wall hernia. It is important to note that the general rate of incisional hernias is relatively high; of these, 22 percent are recurrent incisiona hernias. However, for recurrence and outcomes of incisional hernias, there is rather limited information available in the literature to date. Thus, any type of procedure that needs to deal with recurrence in order to rebuild the abdominal wall especially after applying a mesh needs a very experienced surgeon, more so when it has to be laparo-endoscopic.

Bilateral inguinal hernias

The HerniaSurge Group of international guidelines for groin hernia management have advocated for laparo-endoscopic method in the management of primary bilateral inguinal hernias [7]. Literatures review, taken from registry databases demonstrated that the bilateral inguino-scrotal hernias in the laparo-endoscopic approach are about 28%. It should also be noted that overall complications after BIHR are reported to be higher as compared to those in cases of unilateral inguinal hernia repairs. Therefore, it is imperative that a laparo-endoscopic technique in the bilateral inguinal hernia repair should be undertaken by a PP patient's surgeon with adequate experience and adequate training in this procedure.

Groin hernia in women

This equated to a 8.0-11.5 percent of women amongst all the cases of IHA and 16.7-37 percent of the females that was diagnosed to have femoral hernias. As found in earlier research, anywhere between 14.5% to 17.0% of women have undergone emergency surgeries, thus, three- four times the corresponding figure among men. Consequently, it would be impossible to advice the women that 'watchful waiting' is the best approach to managing the groin hernia. Thus, in the guidelines for the management and treatment of the femoral hernia in women it is recommended to use laparoscopic approach since it has more diagnostic and therapeutic advantages [7]. These studies done with cross-sectional designs in combination with meta-analysis present evidence that women experience chronic pain following hernia repair more than men. Thus, the management of the groin hernia in women has certain differences and certain steeple requirements to the surgeon**.**

Table 1: Impact of General Practice Accreditation on Patient-Reported Quality of Care and Baseline Characteristics.

Aspect	Findings	Implications
Study Design	Natural cluster experimental design evaluating general practice accreditation	Real-world setting assessment of accreditation impact on patient-reported quality of care
Effect of Accreditation on Patient Perception	No strong impact on patient-reported quality of care during the study period	Accreditation alone may not improve patient experience or perceived care quality
Key Domains Assessed	Communication, ease of access, continuity, overall satisfaction	No significant differences found between accredited and non-accredited practices
Organizational Strengthening vs Patient Experience	Improved structure and compliance with safety/quality standards do not guarantee better patient experience	A gap exists between accreditation achievements and benefits perceived by patients
Recommendations	Update accreditation frameworks to focus on patient-centered care metrics	Shift towards interpersonal care, responsiveness, and communication skills improvement
Future Research Suggestions	Long-term analysis of accreditation effects on clinical quality, healthcare usage, staff	Broader evaluation beyond immediate patient-reported outcomes

	satisfaction	
Overall Conclusion	Accreditation emphasizes standardization and accountability but lacks immediate impact on patient-reported care quality	Accreditation processes need reform to prioritize patient experience and quality improvement efforts

Scrotal hernias

The recently published EAES guidelines define scrotal hernias as a complex disease. The major concern in repairing these scrotal hernias is in dissecting out the huge sac fully within both the inguinal canal and the scrotum. Partially insufficient ‘’resection’’ of the hernia sac results in seroma formation and its persistence. “Concerning the implementation of endoscopic approach during scrotal hernia repair it is usually admitted that control of bleeding during separation of the hernia sac from the structures of the spermatic cord could be more difficult”. “Thus, postoperative secondary hemorrhage and hematoma occurrence are diagnosed more often” in these types of hernias. In accordance with the EHS guidelines the open mesh technique remained the first choice in cases of large scrotal hernias. The HerniaSurge Group also recommends an individualized approach of either open or TAPP in presence of large or incarcerated scrotal hernias depending on the surgeon’s experience. According to the registry data for the period 2006–2010, the distribution is 2% for TEP and 3% for TAPP and, in general, scrotal hernias are among the six percent of all inguinal hernia cases.

The symptoms of ventral incisional hernia are very advanced large and complex which are considered to have a high possibility of postoperative complications.

According to various published studies, it has been estimated that 15 percent of incisional hernias occur in sites with defects of length ≥ 10 cm either in the vertical or horizontal direction.

It has been established that in larger hernias, the rate of perioperative complications is influenced and as a result, affects the long-term outcomes. Hernia size has been reported to predict complications; the bigger the size of hernia, the higher the risk of complications.

ASA scoreIn a systematic review of perioperative complications following inguinal hernia repairs, a high ASA score was found to adversely affect the surgical outcome.

This is supported by registry data for both TEP and Lichtenstein repairs. Similarly, for ventral incisional hernias, the negative impact of a high ASA score on the incidence of surgical site infections was also demonstrated. In a multivariable analysis of 5214 laparoscopic intraperitonealonlay mesh repairs for incisional hernias, patients with an ASA score of III/IV, compared to those with a score of I, had a significantly greater risk of developing recurrence.

Age > 80 years In relation to endoscopic inguinal hernia surgery used in the study, the author noted that the rate of the perioperative complications in the octogenarian and older. Historically, in the Spanish National Registry of Incisional Hernia (EVEREG), a worsening of complication rates for incisional hernia repairs in patient >70 years was observed. Therefore, in the choice of further therapy of incisional hernia in patient of elder age one should act wisely [50].

Other risk factors that impact the prognosis of a patient after the surgery include; This includes chronic obstructive pulmonary disease, diabetes mellitus, aortic aneurysm, immunosuppression, corticosteroid treatment, smoking, coagulopathies, use of antiplatelets, and anticoagulant therapy

These interaction factors are known to elevate postoperative complications in inguinal hernia repair operations and the reoperation rates due to the complications. In addition, the same factors have also been seen to affect postoperative complication especially in incisional hernia surgeries as well.

Previous lower abdominal surgery In the present study, 34.9% of the 301 patients operated for inguinal hernia repair had a history of lower abdominal surgery. Where there are conflicts or ambiguities in the feasibility of the guidelines, then the following applies: In case of a laparo-endoscopic surgery it is important to note that it should only be done if the surgeon performing the operation is well experienced in the operation [4–6]. Based on the newly ionized guidelines, herniaSurge Group suggests that the open Lichtenstein technique should be used to treat the following patient population [5].

Proportion of more complicated inguinal and incisional hernias to the overall hernia casesTo date, data that reveal the distribution of at least one of the CI signs in IG or IH patients is scarce in the literature reviews. Thus, in the given analysis, data from the Herniamed Registry was used due to the reasons outlined above. Herniamed has currently listed about 612, 830 cases, 401, 446 of which are of the patients with diagnosed with inguinal hernia on February 1st of 2019. Of these beneficiaries, 394,088 had complete records entered in the database, and 392,035 were patients with the age of 16 years or older. Inguinal hernia surgeries to be precise, emergent inguinal hernia repair made up 2.64% (n= 10, 350). Out of the patients, 11.92 % patients had recurrent inguinal hernia and 17.65 %patients had bilateral herniotomy. Percentage of female was 11.83% (n= 46,

369). Surgical diseases before the operation were scrotal hernias in 3.36% (n = 13,166) patients, history of LAA in 17.76 % (n = 60,613) and 10.63 % (n = 41,501) had BMI ≥ 30 kg/m², 16.35 % (n = 64,102) were of ASA III/IV group. Patients with multiple comorbidities: In terms of prevalence of the disease, it was found that 7.13% of the patients (n=27961) were aged over 80 years. Separately, the prevalence of at least one documented comorbitity was 7.13 % (95 CI 7.08-7.18), n=27,961; COPD, diabetes mellitus, AAA, immunosuppression, corticosteroids, smoking, coagulopathy, antiplatelet agents and anticoagulation. However, if all the characteristics and factors stated earlier contemplating an impact on the outcome of inguinal hernia repair are assumed to have a combined influence on the given cases then the current results showed that 71.57% (280593) of the cases 'pointed' toward at least one characteristic or factor while the rest 28.43% (111442) had relatively low risk levels. In these cases, only three types of hernias were considered: optional, first-line, isolated, site other than scrotum, and those of patients with no risk factors. As for the number of negative influencing factors, applicants stated one (34.80%, n = 136,444), two (21.80%, n = 85,482), three (10.24%, n = 40,160), four (3.64%, n = 14,260), five (0.93%, n = 3,657) six (0.14%, n = 553) and 7 or 8 factors and 36 (n = 36) and 1 (n = 1), respectively). From the patients in the Herniamed Registry a total of 70,748 pertaining to had incisional hernias. Among them, information was available on 68,923, and among the participant, 68,812 were from the age of 16 and above. Among the incisional hernias, 5.21 % were emergent incisional hernia (n = 3,582) and 21.05% of the cases were repeated incisional hernias (n = 14,482). Per W3 ES classification, 11,809 (17.16%) of the patients had the defect width more than 10 cm, 23,179 (33.68%) of them had ASA score of III or IV, and 4,660 (6.77%) of the patients were above 80 years old. Regarding the variability of the risk factors and characteristics that are associated with the poorer outcomes in incisional hernia repair; the results revealed that across the sample population 70.80% (n = 48,722) had the higher risk while 29.20% (n = 20,090) were the lower risk group. They were mainly direct, first afflicted, small to medium sized, incisional and no comorbid risks overall.

CONCLUSIONS

The shortcoming of the presented literature and data from the Herniamed Hernia Registry provide insights into what it is like to perform abdominal wall surgery and the current stage of training for it. And it can be quite claimed that with the help of a differentiated approach in inguinal and incisional hernia repairs, the requirements for the surgeon are constantly increasing, as it is currently known that there are many various different methods of the surgery which are different from each other and have their own period of training. This is in regard to the fact that in order to learn the ability to employ them, one has to memorize them, among others. I n the light of the guidelines [2–14], it was necessary to identify a particular strategy of prediction to lessen the risk and realize the specificity of the abdominal wall surgery. Nonetheless, there are risk factors that are known to influence the result of the surgery making the abdominal wall surgery even more complicated. These perceived barriers include emergency operation, obesity, recurrent hernia, bilateral hernia, hernia in women, and scrotal hernia, size of the hernial defect, ASA score of 3 or more, age greater than 80 years, medical complications, and lower abdominal operations. These factors which are described above as complicating factors are in fact very common and are seen in 70% of patients with Inguinal/Incisional Hernias based on the data derived from the Herniamed Hernia Registry. Among these patients, 36% have co-morbidity, and patients with more than one risk factor have poor surgical outcomes because of their condition. Thus, realizing that each case is unique, that it takes time to gain mastery in certain specific surgical operations, and that there is a very high probability of the existence of other chronic diseases with a patient, the essence of the increased complexity of the surgery of the abdominal wall becomes apparent. A perfect question arises at this point, which questions the presented work: whether general surgery training is as per the minimum expectations of the TNAs as far as abdominal wall surgery is concerned based on the data gleaned from the literature? In performing a mere 50-100 procedures of which only 25 were laparo-endoscopic repair, the sample may not be enough to effectively negate learning curve that is pertaining to the following variations of the particular surgical process such as TEP, TAPP, Lichtenstein, Shouldice, laparoscopic IPOM, open sublay, open or endoscopic component separation technique and open onlay repairs. Therefore, the training of general surgeons should be augmented to attain competencies to adequately address the care of patients with abdominal wall hernias after the learning curve of both open and laparo-endoscopic hernia operations as proposed in the current guidelines [1]. There are several fellowship programs after the general surgery training and these are available and popular as they offer the further training and career accomplishments. A descriptive questionnaire was given to the trainees and the findings of the survey show that a general surgical trainee will have done or had chances of doing a clinical fellowship of 76%. "Competency enhancement, confidence building and innovativeness of the sub-specialties are generally the main goals". Without any doubt and as it has been valued by many it is clear that young surgeons are eager to continue with their surgical training and undertake Supervised fellowships after going

through basic general surgery training. It is for this reason that it is certainly feasible to design a programme which must enable young general surgeons to increase the scope of their oration as well as their experience in abdominal wall surgery. The other is how the general surgeons who have a special interest in hernia surgery can revise their procedures through shadowing in those centers, and through attending the workshops and congresses. Taking the results of the research shown above, it can be stated that it is necessary to conduct a special training to the discipline of the abdominal wall surgery as the complexity of this treatment increases in unemlined, a large number of methods are to be used, and finally, complicated with the problems of the patients with the higher average number of comorbidities.

REFERENCES

1. Simons, M.P., Aufenacker, T., Bay-Nielsen, M., Bouillot, J.L., Campanelli, G., Conze, J., (2009). European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia,* 13, 343–403.
2. M, Peeters, E., Aufenacker, T., Bouillot, J.L., Campanelli, G., Conze, J., (2012). Update with level 1 studies of the European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia,* 18, 151–163.
3. Bittner, R., Arregui, M.E., Bisgaard, T., Dudai, M., Ferzli, G.S., Fitzgibbons, R.J., (2011). Guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal hernia [International Endohernia Society (IEHS)]. SurgEndosc, 25, 2773–2843.
4. Bittner, R., Montgomery, M.A., Arregui, M.E., Bansal, V., Bingener, J., Bisgaard, T., (2011). Update of guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal hernia [International Endohernia Society (IEHS)]. *SurgEndosc,* 29, 289–321.
5. Poelman, M.M., van den Heuvel, B., Deelder, J.D., Abis, G.S.A., Beudeker, N., Bittner, R., (2013). EAES consensus development conference on endoscopic repair of groin hernias. *SurgEndosc,* 27, 3505–3519.
6. The Hernia Surge Group. 2012. International guidelines for groin hernia management. *Hernia,* 22, 1–165.
7. Bittner, R., Bingener-Casey, J., Dietz, U., Fabian, M., Ferzli, G.S., Fortelny, R.H., Köckerling, F., (2011). Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias SurgEndosc, 28, 2–29.
8. Bittner, R., Bingener-Casey, J., Dietz, U., Fabian, M., Ferzli, G.S., Fortelny, R.H., Köckerling, F. (2012). Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias [International Endohernia Society (EHS) - Part 2]. *SurgEndosc,* 28, 353–379.
9. Bittner, R., Bingener-Casey, J., Dietz, U., Fabian, M., Ferzli, G.S., Fortelny, R.H., Köckerling, F. (2012). Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias [International Endohernia Society (EHS) - Part 3]. *SurgEndosc*, 28, 380–404.
10. Bittner, R., Bain, K., Bansal, V.K., Berrevoet, F., Bingener-Casey, J., Chen, D. (2019). Update of guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias [International Endohernia Society (EHS)]. *SurgEndosc,* 33, 3069–3139.
11. Earle, D., Roth, J.S., Saber, A., Haggerty, S., Bradley, J.F., III, Fanelli, R. (2016). SAGES guidelines for laparoscopic ventral hernia repair. *SurgEndosc,* 30, 3163–3183.
12. Silecchia, G., Campanile, F.C., Sanchez, L., Ceccarelli, G., Antinori, A., Ansaloni, L. (2015). Laparoscopic ventral/incisional hernia repair: updated guidelines from the EAES and EHS endorsed consensus development conference. *SurgEndosc,* 29, 2463–2484.
13. Liang, M.K., Holihan, J.L., Itani, K., Alawadi, Z.M., Gonzalez, J.R., Askenasy, E.P. (2017). Ventral hernia management—expert consensus guided by systematic review. *Ann Surg,* 265, 80–89.
14. Stechemesser, B., Jacob, D.A., Schug-Paß, C., Köckerling, F. (2012). Herniamed: an internet-based registry for outcome research in hernia surgery. *Hernia*, 16, 269–276.
15. Nilsson, H., Styliandidis, G., Haapamäki, M., Nilsson, E., Nordin, P. (2007). Mortality after groin hernia surgery. *Ann Surg,* 245, 656–660.
16. Kjaergaard, J., Bay-Nielsen, M., Kehlet, H. (2010). Mortality following emergency groin hernia surgery in Denmark. *Hernia*, 14, 351–355.

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