Modern concepts in the treatment of hernias. The emergence of Abdominal Wall Surgery as a subspecialty of General Surgery.

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This thesis is dedicated to people with hernias.

I am grateful for the opportunity to express my deepest appreciation to the many individuals and organisations who have played a vital role in shaping my research career. To my mentors, collaborators, friends and sponsors from around the world, thank you for your generosity, guidance, and unwavering support. Your invaluable contributions have enabled me to conduct meaningful research that has advanced our understanding of important issues.

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Abstract

Tato práce je komentovaným souborem mého přínosu k rozvoji oboru rekonstrukce břišní stěny v jeho současné podobě. Vybrala jsem přednostně práce, které se týkají témat, jenž rezonují odbornými společnostmi v tomto oboru a současně jsou častými tématy vědeckých diskusí. Některé z nich upozorňují na opomíjené momenty v odborné přípravě mladých chirurgů.

Obor rekonstrukce břišní stěny je rozmanitý a velmi dynamický, kontinuálně se vyvíjí poháněn pokroky v chirurgických technikách, materiálech i díky podrobnějšímu chápání fyziologie břišní stěny. V této práci jsem se snažila ukázat alespoň část ze škály předmětů bádání, které se v tomto oboru naskýtají, od inovativních chirurgických materiálů a technik po zkoumání kvality života pacientů.

This work is a compilation of several papers, each representing a facet of my contributions to the advancement of abdominal wall reconstruction in its present state. I have chosen these papers to encompass topics that not only resonate within the field but also serve as focal points for scientific discourse. Additionally, they shed light on overlooked areas in the education and training of aspiring young surgeons.

The field of abdominal wall reconstruction is multifaceted and continually evolving, driven by advancements in surgical techniques, materials, and understanding of abdominal wall physiology. As such, my contributions aim to address various aspects of this complex discipline, ranging from innovative surgical approaches to nuanced considerations in patient care and outcomes.

Introduction

#ItsJustaHernia has sparked a global conversation, highlighting the misconception that all General Surgeons are equipped to manage abdominal wall hernias. Hernia surgery, while often perceived as straightforward, requires a depth of knowledge and expertise that is rapidly evolving. Over the past decade, the field has seen a significant expansion in research publications, with the emergence of dedicated journals focusing solely on abdominal wall hernias. The recognition of Abdominal Wall Surgery as a separate subspecialty by organizations like UEMS (Union Européenne des Médecins Spécialistes, European Union of Medical Specialists) underscores the growing complexity and importance of this field.

Mesh augmentation has become the standard approach in most hernia repairs, with Frank Usher's pioneering work in 1958 (Usher, 1958) laying the foundation for modern mesh hernia repair. However, advancements in materials and surgical techniques continue to shape the landscape of hernia surgery. Concepts such as pre-habilitation, optimisation, and rehabilitation are now recognised as vital components of the surgical process, alongside efforts to measure hernia-specific quality of life and patient satisfaction.

The traditional view of the abdominal wall as a passive barrier has evolved (Naraynsingh, 2012). It is now understood to be a dynamic organ whose function is compromised in the presence of a hernia, leading to issues such as loss of core stability and chronic pain. Mesh augmentation aims to restore abdominal wall function, with various surgical techniques and mesh types available to suit individual patient needs (Ahmad, 2019; Bringman, 2010). However, selecting the right mesh and placement is critical, as factors like mesh size, chemical composition, and pore characteristics influence its behaviour in vivo.

The importance of surgical technique cannot be overstated, with an emphasis on placing mesh away from the subcutaneous space and outside the peritoneal cavity. Surgeons must be trained in a variety of open and minimally invasive techniques to provide tailored care to each patient. Personalized approaches, guided by informed consent and a thorough discussion of risks and benefits, are essential for optimizing outcomes (Kockerling, 2019).

While robotic assistance has revolutionized hernia surgery, it is just one tool among many in the surgeon's toolbox. A sound understanding of abdominal wall anatomy is crucial, especially when employing advanced techniques such as anterior and posterior component separation (Ramirez, 1990; Novitsky 2012). Honesty about potential complications, such as muscle denervation and iatrogenic hernias, is necessary for improving patient safety and outcomes (Wegdam, 2022, Oprea 2016).

Quality measures in hernia surgery have shifted towards patient-centred outcomes, with a focus on factors like patient satisfaction and quality of life (East, 2021; Kehlet, 2008). Chronic pain, a significant concern for many patients, has only recently become a key area of research. Additionally, there is growing recognition of the importance of prevention in reducing the burden of incisional hernias following laparotomy (Israelsson, 2013; Muysoms, 2015).

The evolving nature of hernia surgery reflects a global effort to improve outcomes and patient care. However, many general surgeons may not be up to date with the latest advancements in the field. Patient empowerment, facilitated by access to information through organizations like the European Hernia Society, is crucial for ensuring quality care. Patients are encouraged to advocate for themselves by seeking out surgeons who are members of hernia societies and adhere to best practice guidelines.

In conclusion, hernia surgery is no longer a simple procedure but a highly specialized field that combines expertise from multiple disciplines. By embracing new technologies and techniques, surgeons can continue to improve outcomes and meet the evolving needs of patients worldwide.

The Patient as the Focal Point of Hernia Surgery

Patient-Reported Outcome Measures (PROMs) are instrumental in capturing an individual's perception of their health through versatile questionnaires, distributable via paper, online platforms, or smartphone applications. These tools empower patients to articulate their quality of life, daily functioning, symptoms, and overall well-being (Meadows, 2011). The surge in publications on PROMs in surgery underscores a growing inclination to centre healthcare around the patient (Churraca, 2021). However, despite their popularity, misconceptions persist, leading to errors in their application.

While PROMs have become pivotal in surgical research, ensuring their data remains unbiased is paramount. Many established PROMs lack patient involvement in their design, diminishing their value in patient care. Asking questions solely of interest to surgeons' risks overlooking patients' priorities, potentially resulting in incomplete data collection. Factors such as the mode and timing of completing PROMs can influence patient responses. Moreover, subsets like Patient-Centred Outcomes (PCOs) and Patient-Reported Experience Measures (PREMs) enhance the depth of questioning.

PROMs evaluate constructs through instruments that can yield unidimensional or multidimensional scores, catering to diverse disease entities. Validating these instruments involves intricate processes to ensure they measure intended aspects accurately. Language validation, internal and external validity, and assessing the clinical significance of score changes are essential considerations.

Generic PROMs like the SF-36 and EQ-5D offer comprehensive assessments (Craig, 2003), while condition-specific ones such as the Carolinas Comfort Scale (Heniford, 2008), HerQLes (Krpata, 2012), EuraHS (Muysoms, 2016) and Abdominal Hernia-Q (Mauch, 2020), provide targeted evaluations for hernias. Despite variations in scale lengths and specifics, the ultimate goal remains to inform healthcare decisions effectively.

NHS England's investment in collecting PROMs for inguinal hernia surgery using EQ-5D and EQ-VAS exemplifies how choosing a wrong PROM can lead to a wrong conclusion and the growing reliance on disease specific PROMs for healthcare decisions (DigitalNHS, 2017).

High-quality research in hernia management will shape guidelines and practice, relying on standardized clinical endpoints and robust PROMs. However, challenges persist, as evidenced by recent reviews on inguinal and incisional hernias (Gram-Hanssen, 2020; Harji, 2021). Variability in reported outcomes complicates meta-analyses, while PROMs predominantly designed by surgeons lack broader input. Future efforts should prioritize the scientific development of PROMs through patient involvement and interdisciplinary collaboration (Scrimgeour, 2021).

In the realm of surgery, few areas witness the level of patient activism seen in hernia surgery, with patients engaging on social media, in mainstream media, and through government lobbying. Notably, a significant anti-mesh lobby has emerged, particularly prevalent in countries like the USA, Australia, New Zealand, and the UK, profoundly influencing interactions between surgeons and patients.

While a comprehensive review of these dynamics exceeds the scope of this thesis, it's evident that hernia surgery grapples with quality concerns. Consequently, an international collaborative effort with experts and patient representatives was undertaken to survey patient preferences in their hernia repair journey. The results serve as a clarion call for anyone vested in hernia surgery.

Patients articulate a desire for surgeons not only to possess expertise but also to engage them in shared decision-making during informed consent processes. Specialist care is highly valued, with patients prioritizing post-surgery quality of life as the paramount outcome measure. In the event of post-surgery complications, patients advocate for being heard and for comprehensive support services.

Moreover, we propose reframing terminology, advocating for "hernia-surgery-injured" over "mesh-injured" for enhanced clarity in communication. There's a clear call for greater patient involvement in shaping hernia services that align with their needs. Despite its importance, follow-up in hernia surgery lags behind cancer care, highlighting the need for proactive measures to track long-term outcomes and address patient concerns.

Patient – Mesh interaction

The introduction of synthetic mesh, derived from petroleum-based materials like nylon, polyester, and polypropylene, revolutionized hernia surgery, reshaping its landscape profoundly. Decades of research into the intricate patient-mesh interaction have revealed numerous insights, yet each discovery only underscores the vast expanse of uncharted territory. With each passing day, our understanding of this critical interaction continues to expand, challenging us to delve deeper into its complexities.

Initially, heavyweight mesh prevailed but posed challenges like foreign body sensation and excessive scarring (Klosterhalfen, 2005). Lightweight meshes emerged to address these issues, particularly in polypropylene meshes (Lake, 2015). Porosity, crucial for scar formation, varies among meshes, influenced by factors such as fibre thickness and weaving process (Klinge, 2012). While polyester meshes now utilize monofilament threads to reduce bacterial harbouring, ePTFE meshes, once anti-adhesive options, faced challenges in infection management and are rarely used today.

Biological meshes, once heralded as revolutionary, face scepticism due to limited evidence supporting their efficacy (Melman, 2011; Rosen, 2022; Köckerling, 2018). Absorbable meshes like Vicryl lack sufficient evidence for their anti-adhesion properties. Biosynthetic meshes, combining the ideal extracellular matrix structure of biological meshes with artificial manufacturing, promise improved cost-effectiveness and degradation control, yet controversies persist regarding their behaviour (DeNoto, 2022; Mathilde, 2020; Roth, 2021; Ruiz-Jasbon, 2014). Pioneering nano mesh technology, explored in the Czech Republic, also holds promise for hernia repair. We have researched this extensively in animal models, also with conflicting results (Plencner, 2014; Plencner, 2015; East, 2018; East, 2019).

At the heart of it all lies a shared uncertainty about the destiny of implanted materials, particularly when infection comes into play—an area where our understanding remains particularly murky. It's evident that surgical technique plays a pivotal role, yet the global standard of training often falls short of what's truly needed.

Complications arising from hernia repair frequently lead patients to attribute adverse reactions to the implanted mesh material. While this assumption isn't always accurate,

dispelling such beliefs can be a daunting task, especially in light of the considerable influence wielded by advocacy groups, particularly those focused on issues surrounding vaginal and pelvic mesh.

Adding to the complexity, the absence of a universal standard in mesh testing further complicates efforts to address patient concerns and enhance outcomes (Liu, 2020). The European Hernia Society (EHS) is actively working to improve this situation by establishing a registry for post-market surveillance, as mandated by the new Medical Device Regulation (MDR). Previously, meshes were classified as class II implants, resulting in inadequate testing protocols. However, there is hope for improvement with the upcoming implementation of the MDR, although this shift may bring increased costs and potential barriers to innovation in mesh development.

Many patients attribute complications from their mesh hernia repair to their body's reaction to the implanted material, often due to widespread autoimmune disease. However, studies have found no direct correlation between hernia mesh use and autoimmune disease onset, though concerns remain about the retrospective nature of these studies and potential biases. Additionally, factors like stress, smoking, gut microbiome, and diet further complicate the relationship between hernia mesh and autoimmune disease.

Moreover, the scarcity of rheumatologists and immunologists in many countries leaves patients feeling abandoned and turning to the internet for answers. Profit-driven medical practices and the emergence of "Mesh Implant Illness" contribute to patient confusion and misinformation (Fadaee, 2023). While pelvic mesh removal centres exist, hernia mesh removal is distinct and often necessary in cases of recurrence or infection. However, it's crucial to differentiate between autoimmune reactions and allergic responses, emphasizing that not all systemic symptoms stem from autoimmunity.

Despite extensive research, a definitive link between hernia mesh and autoimmune disease remains elusive. Patients experiencing systemic symptoms necessitate thorough evaluation and referral to relevant specialists for prompt treatment. Mass explantation driven by suspicions of autoimmunity lacks empirical support and may worsen confusion regarding immunological terminology. Clear communication and

adherence to accurate nomenclature are essential in addressing patient concerns and dispelling misconceptions. Addressing these questions has been a primary focus of our recent research, and we are presently conducting a study investigating mesh-specific antibodies to provide further insights (Jíšová, 2023).

Is incisional hernia preventable?

Access to the abdominal cavity, whether through laparotomy or laparoscopy, is integral to various surgical specialties focused on the abdomen and pelvis. One common concern across these specialties is the risk of abdominal wall closure failure, manifesting as incisional hernia. Incisional hernias affect 10 to 20% of patients undergoing midline laparotomy, with higher rates observed in certain high-risk groups, such as those with aortic aneurysms (Nguyen, 2020), obese, immunosuppressed, those with collagen disorders, with contaminated wounds etc. (Muysoms, 2015). However, the role of the surgeon in incisional hernia formation is often underestimated.

Efforts to mitigate incisional hernia rates have a long history, with techniques like the "4:1 ratio rule" proposed by Jenkins in 1976 and popularized by Prof. Israelsson in 1993 (Jenkins, 1976; Israelsson, 1993). However, it wasn't until 2015 that an international group led by Dr. Muysoms published a systematic review and guideline on this topic, shedding light on evidence-based approaches to abdominal closure (Muysoms, 2015). Despite the routine nature of abdominal closure, the evidence base was surprisingly sparse, hindering strong recommendations. The update of these guidelines was completed in 2022 with no changes to the original recommendations (Deerenberg, 2022).

Early studies didn't find significant differences in hernia rates based on suture material or technique, until the advent of the small stitch small bite technique, which demonstrated promising results in reducing hernia rates (Millbourn, 2009). Subsequent trials confirmed these findings, though concerns about generalisability to diverse patient populations persist (Deerenberg, 2015; Theodorou, 2022). However, the small bite small stitch technique remains underutilized, with many surgeons still favouring traditional methods despite compelling evidence (European Society of Coloproctology (ESCP) collaboration, 2021).

Ongoing research also explores alternative closure methods, such as mesh augmentation, particularly in high-risk patients. Synthetic mesh onlay augmentation shows promise in reducing hernia incidence, though comparisons with small bite small stitch closure are lacking in most studies (Jairam, 2020; Bravo-Salva, 2021; HAART, 2022).

A team in the Czech Republic, with whom I had the pleasure of working, conducted experiments using biodegradable nanofibers and various adjuncts to aid in the healing process of the abdominal wall. A more detailed account of our experiments can be found in my PhD thesis. In summary, after numerous trials in which we struggled to attain the appropriate fibre structure, molecular weight, thickness, and density necessary to produce the right amount of fibrosis, we observed very promising effects of these fibres on healing fascia, even without any mechanical strength. As a result, we abandoned the use of mesh entirely. We found that fibres that were frozen and milled and subsequently mixed with a slow-setting fibrin sealant were equally effective and increased the mechanical strength of the healing abdominal wall in a rabbit model by almost 50% six weeks after laparotomy (East, 2022).

The small bite, small stitch, and mesh augmentation in higher risk groups have been big steps forward in incisional hernia prevention (Fortelny, 2023). Liquid mesh has yet to transcend from the laboratory to human testing – but we have demonstrated a proof of concept. Further studies in the type of ‘mesh’ material, the optimal carrier solution, and rapid off the shelf preparation with an easy method of application are necessary. Right now, the management of patients with an incisional hernia is a big burden to patients and healthcare systems, with variable results.

Management of Incisional Hernia: Guidelines and Evidence Based Decision Making

In the realm of abdominal wall surgery, the management of incisional hernias stands as a testament to the evolving landscape of surgical techniques. Over time, these techniques have undergone significant transformations, propelled by pivotal moments in surgical history.

Incisional hernia treatment, often considered a "failure" surgery due to its high recurrence rates, has posed considerable challenges for surgeons. Despite the widespread adoption of mesh in hernia repairs over the past two decades, early pioneers of suture repair, such as Karel Maydl and Da Silva (Da Silva, 1979; Sanders, 2012), laid the groundwork for modern techniques. Their approaches, though adapted with the introduction of mesh, provided crucial insights into the complexities of abdominal wall reconstruction.

The advent of modern synthetic mesh revolutionized hernia repair (Liujendijk, 2000), leading to the popularization of techniques like the 'inlay' repair. However, as experience grew, it became evident that bridging repairs like the 'inlay' technique were prone to recurrence. French surgeon Chevrel's 'onlay' mesh technique emerged as a significant advancement (Chevrel, 1986), offering improved outcomes by addressing the underlying pathology while minimizing recurrence rates. Yet, challenges persisted, with complications like seroma posing ongoing concerns.

Amidst these advancements, the sublay repair technique introduced by Rives and Stoppa offered a promising alternative, positioning the mesh away from the abdominal cavity and subcutaneous space (Rives, 1973; Stoppa, 1992). Despite its efficacy, the technique required refinement to address complications like surgical site infections. Subsequent iterations, such as the intraperitoneal onlay mesh (IPOM) technique, initially showed promise but faced setbacks due to high recurrence rates and complications (Tse, 2010).

The evolution of hernia repair techniques saw the rise of minimally invasive approaches, heralding a new era in abdominal wall surgery. Innovations like the eTEP (Daes, 2012) and TAR (Novitsky, 2012) techniques, coupled with robot-assisted

surgery (Baig, 2019), provided surgeons with greater precision, and reduced surgical site complications. These techniques, while not without challenges, offered patients a less invasive alternative with shorter recovery times.

However, as surgical techniques advanced, questions arose regarding the significance of restoring the linea alba (Naraynsingh, 2012). The emergence of alternative techniques like the hernia sac flap repair (Malik, 2014) challenged traditional paradigms, offering comparable outcomes with reduced complications (Nielsen, 2019; Petersson, 2020). This shift in perspective underscored the importance of tailoring surgical approaches to individual patient needs.

Today, the field of abdominal wall surgery continues to evolve, with a diverse array of techniques at surgeons' disposal. From component separation to fascial traction, each approach carries its own benefits and considerations. Collaboration between disciplines, such as plastic surgery, further enhances patient outcomes by addressing aesthetic concerns alongside functional restoration.

Determining the most suitable surgical approach for a patient requires active engagement and collaboration between surgeons and their patients. This shared decision-making process empowers patients to participate in selecting the optimal operative route tailored to their unique circumstances. While surgeons may have their preferred techniques, particularly in routine cases, the complexity of certain scenarios necessitates consideration of alternative options. Having a diverse repertoire of techniques at their disposal enables surgeons to navigate challenges effectively and strive for optimal outcomes.

In the realm of incisional hernia management, the European Hernia Society (EHS) has taken a proactive stance by issuing guidelines to steer clinical practice. These guidelines, rooted in the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) methodology, provide evidence-based recommendations for the treatment of midline hernias up to 10 cm in width (Sanders, 2023). This focus reflects the prevalence of such hernias and acknowledges the expertise required to manage larger or more intricate cases.

The GRADE methodology, a widely recognized framework for developing clinical

practice guidelines, ensures transparency, rigor, and consistency in the evaluation of evidence and formulation of recommendations. By systematically assessing the quality of evidence and weighing the balance between benefits and risks, GRADE facilitates informed decision-making and enhances the credibility of guidelines. This approach aligns with the principles of patient-centred care, emphasizing the importance of integrating patient values and preferences into clinical decision-making.

Preoperative optimisation

The success of abdominal wall reconstruction (AWR) hinges on several critical factors, including the accommodation of abdominal contents within the newly created cavity. Historically, AWR procedures often resulted in challenges such as difficulty in extubating post-operation due to the compression of abdominal organs within the cavity. This was particularly common when AWR involved mass closure of the abdominal wall combined with a substantial onlay mesh, leading to restricted space for diaphragmatic movement. In extreme cases, patients resorted to measures like omentectomy or colon resection to alleviate this issue.

A primary strategy to address this challenge is weight loss, which effectively increases intra-abdominal space. Most AWR patients can achieve weight loss with appropriate support. Our institution has developed a comprehensive program for AWR patients, integrating weight loss initiatives, overall fitness improvement, and physiotherapy based on neuromuscular activation principles advocated by Prof. Kolář and colleagues. This program facilitates safe and effective weight loss and enhances patients' overall fitness preoperatively, a particularly daunting task for those with limited mobility.

Notably, even modest weight loss can yield significant gains in intra-abdominal space. For instance, a loss of 5 kg in males and 7 kg in females translates to approximately 1 Liter of additional intra-abdominal volume. While there is no definitive BMI cutoff for AWR candidacy, a BMI over 35 typically correlates with an increased risk of postoperative complications.

Beyond physiological benefits, this program offers valuable psychological support to patients. Completion of the three-month program fosters a sense of community and belonging among individuals with hernias, as they engage in group sessions within the hospital's supportive environment. This camaraderie, coupled with the euphoria induced by physical activity, often motivates patients to adopt healthier lifestyles.

However, preoperative planning extends beyond weight loss and encompasses comorbidity optimization, including diabetes mellitus management, or correction of anaemia are essential. Additionally, screening for bacterial colonization, such as

MRSA, remains crucial, with preoperative decolonization protocols in place to mitigate infection risks (Wouters, 2022).

While the concept of preoperative optimization is not novel, its full implementation remains a challenge. Despite its proven benefits, many patients continue to grapple with complications that could have been averted through proper pre-optimization (Jenssen, 2022) as shown in our publication dedicated to this topic. Limited investment in formal pre-optimization facilities in some countries underscores the need for patient engagement and education regarding the significance of these interventions.

Oral hygiene

In the broader context of preoptimization efforts, the discussion on dental hygiene's role concerning the presence of large synthetic implants as potential sources of infection emerged. Initially, our proposition of a mesh infection originating from bacteraemia in the mouth was met with scepticism from many experts. However, spurred by patient accounts detailing tooth loss due to persistent mesh infections, we embarked on an exhaustive investigation to explore the potential link between dental health and distant synthetic implant infections.

After 15 months of relentless effort and numerous rejection letters, we finally found a receptive audience willing to entertain the notion that repetitive bacteraemia could lead to distant implant infection (East, 2023). Drawing parallels with preoperative protocols in cardiothoracic or orthopaedic surgery, we advocate for AWR patients to undergo comprehensive dental evaluations before their procedures.

It's vital to acknowledge the frequency of bacteraemia episodes, which can occur up to 300 times a day during routine activities like chewing and brushing. Additionally, tooth plaque's microbial composition is diverse, often containing anaerobes and bacteria typically associated with skin flora.

Groin hernia as an emergency

The repair of groin hernias is a common surgical procedure globally, but with the COVID-19 pandemic leading to a reduction in elective benign surgical activity, concerns have arisen regarding an increase in acute hernia presentations. This has prompted a revisit to a technique that has fallen out of favour in many places: taxis, which involves manually reducing an incarcerated groin hernia under sedation or analgesia. It's notable that a generation of surgeons has been trained without exposure to this technique.

One concern with taxis is the risk of reducing bowel that has already infarcted, potentially leading to bowel perforation and peritonitis. Another concern is the possibility of reducing the hernia en-masse, leaving obstructed bowel within the hernia ring. Symptoms and signs indicating bowel infarction, such as the neutrophil-to-leukocyte ratio and lactate levels, often go unnoticed during assessment, with lactate levels remaining normal until late stages due to the short length of bowel within a hernia.

Emergency hernias, including groin hernias, are high-risk conditions, with morbidity and mortality rates comparable to or worse than emergency colorectal surgery (NASBO, 2020; Köckerling, 2021). Our research has led to a paper outlining safe taxis performance and the best approach for suspected bowel ischemia and has become a basis for a chapter in the updated Hernia Surge guidelines (East, 2020; Pawlak, 2021).

Standardised education – Hernia Basecamp

Abdominal wall reconstruction (AWR) goes beyond surgical techniques, fostering a collaborative community where surgeons exchange knowledge and support. Platforms like the International Hernia Collaboration on Facebook and Twitter facilitate connections, case discussions, and patient engagement. Patient feedback is crucial, leading to the establishment of the Hernia Patients Support Group on Facebook in 2022. With over 3,400 active followers, we provide education and support, led by patient representative Jackie Bullock.

While social media offers insights, balanced learning is essential. Organizations like the European Hernia Society (EHS) provide structured programs and hands-on courses for surgeons. Motol University Hospital exemplifies this commitment with advanced learning programs and cadaver labs.

In the age of online information dissemination, rigorous peer review and evidence-based practice are paramount. By integrating social media networking with standardized teaching, we can improve patient outcomes, foster professional development, and mitigate risks associated with unverified sources.

In 2020, in collaboration with Andrew de Beaux, Secretary General of the EHS and a surgeon from Edinburgh, Scotland, and with generous support from Medtronic's education grant, we launched Hernia Basecamp. This online learning resource, sitting at the Websurg platform hosted by IRCAD University in Strasbourg, initially aimed to serve as a live textbook for candidates preparing for the UEMS AWR examination in Copenhagen in October 2021. However, it quickly evolved into one of the most widely utilized resources for abdominal wall surgery globally.

Hernia Basecamp is not a traditional written textbook, but a comprehensive library of over 200 video lectures and it keeps evolving with new material being added on regular basis. Since its inception, the platform has delivered over 3000 hours of hernia education. To enhance its utility, we structured several lectures into ten distinct modules, each spanning three hours. These modules include a 10-question multiple-choice quiz, which, upon successful completion, earns participants official CME

accreditation from UEMS.

By April 2023, Hernia Basecamp had garnered over 11,000 active followers, indicating its significant impact within the surgical community. Organized into eight chapters or "camps," the platform serves as an essential knowledge base for surgeons interested in performing hernia operations.

More than just a repository of instructional videos, Hernia Basecamp offers curated lectures designed to aid surgeons in making informed decisions for their patients. Every lecture undergoes rigorous review and validation by key opinion leaders and renowned experts, ensuring high-quality and accurate content.

Accessible from anywhere in the world, Hernia Basecamp continues to expand its offerings. In addition to its extensive library, we regularly host live interactive webinars on pressing AWR topics, providing an opportunity for real-time engagement and discussion among participants. These sessions complement the standard lectures and recommended readings available on the platform, further enriching the learning experience for surgeons worldwide (de Beaux, 2023).

Colorectal and orthopaedic surgeons have since launched Colorectal and Wrist Endoscopy Basecamps following the Hernia Basecamp example.

Conclusion

The field of hernia surgery has undergone significant advancements in recent years, propelled by innovations in closure techniques and the ongoing refinement of mesh materials. These advancements have not only revolutionized surgical approaches but have also yielded tangible improvements in patient outcomes and experiences. However, amidst these strides, persistent controversies surrounding mesh implants and potential autoimmune reactions persist, underscoring the critical need for transparent communication and evidence-based interventions to navigate these complexities effectively.

Hernia management continues to evolve dynamically, underpinned by a steadfast commitment to optimizing surgical techniques and maximising patient satisfaction. The preoperative phase emerges as a pivotal stage in achieving successful abdominal wall reconstruction, emphasising the importance of comprehensive patient evaluation and preparation. This preoptimization process ensures that patients are adequately prepared for surgery, minimizing potential risks, and enhancing postoperative recovery.

Furthermore, standardised education initiatives play an indispensable role in equipping surgeons worldwide with the necessary knowledge and skills to navigate the intricacies of hernia surgery effectively. By providing access to up-to-date guidelines, best practices, and surgical techniques, these initiatives foster a global community of learning and collaboration, enabling healthcare providers to deliver high-quality care consistently.

In navigating the multifaceted landscape of hernia surgery, maintaining a patient-centred approach remains paramount. By actively engaging patients in shared decision-making processes and tailoring treatment plans to their individual needs and preferences, healthcare providers can enhance overall outcomes and promote patient satisfaction. This patient-centric paradigm acknowledges the unique

circumstances and priorities of each patient, facilitating more personalised and effective care delivery.

Hernia surgery is often hailed as a quality-of-life operation, aiming not only to repair anatomical defects but also to alleviate discomfort and restore functional integrity. However, the relentless pursuit of surgical perfection can impose immense pressure on healthcare providers, particularly in the absence of standardised protocols and quality control measures comparable to those in other medical specialties like cancer care. This pressure underscores the urgent need for the establishment of standardised practices and evidence-based guidelines in hernia surgery to ensure optimal outcomes and mitigate the risk of adverse events.

In summary, the field of hernia surgery stands at the forefront of medical innovation, driven by a relentless commitment to improving patient care and surgical outcomes. By embracing a patient-centred approach, prioritizing preoperative optimization, and advocating for standardised practices, healthcare providers can navigate the complexities of hernia surgery with confidence and compassion, ultimately enhancing the quality of care and advancing the field as a whole.

References

Ahmad, M. H., Pathak, S., Clement, K. D., & Aly, E. H. (2019). Meta-analysis of the use of sterilized mosquito net mesh for inguinal hernia repair in less economically developed countries. BJS Open, 3(3), 429-435. doi: 10.1002/bjs5.50147

Baig, S. J., & Priya, P. (2019). Extended totally extraperitoneal repair (eTEP) for ventral hernias: Short-term results from a single centre. Journal of Minimal Access Surgery, 15(3), 198-203. doi: 10.4103/jmas.JMAS_29_18

de Beaux, A., Becker, S., Parent, T., Temporal, G., Kummer, R., Allouard, C., East, B. (2023). Hernia Basecamp- a free to use, online hernia learning platform. Analysis of its use since launch in June 2021. J. Abdom. Wall Surg. 2:11803. doi: 10.3389/jaws.2023.11803

Bravo-Salva, A., Argudo-Aguirre, N., González-Castillo, A.M., et al. (2021). Long-term follow-up of prophylactic mesh reinforcement after emergency laparotomy. A retrospective controlled study. BMC Surg, 21, 243. doi: 10.1186/s12893-021-01243-x

Bringman, S., Conze, J., Cuccurullo, D., Deprest, J., Junge, K., Klosterhalfen, B., Parra-Davila, E., Ramshaw, B., & Schumpelick, V. (2010). Hernia repair: the search for ideal meshes. Hernia, 14(1), 81-87.

Chevrel, J. P., Dilin, C., & Morquette, H. (1986). Traitment des èventrations abdominales mèdianes par autoplastie musculaire et prothèse prè-muscolo-aponèurotique. Chirurgie, 112, 616–622.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc, 35, 1381-95. doi: 10.1249/01.MSS.0000078924.61453.FB

Churruca, K., Pomare, C., Ellis, L. A., Long, J. C., Henderson, S. B., Murphy, L. E. D., Leahy, C. J., & Braithwaite, J. (2021). Patient-reported outcome measures (PROMs): A review of generic and condition-specific measures and a discussion of trends and issues. Health Expectations, 24(4), 1015-1024. doi: org/10.1111/hex.13254

Daes, J. (2012). The enhanced view-totally extraperitoneal technique for repair of inguinal hernia. Surgical Endoscopy, 26, 1187–1189.

Deerenberg, E. B., Henriksen, N. A., Antoniou, G. A., Antoniou, S. A., Bramer, W. M., Fischer, J. P., ... & Muysoms, F. (2022). Updated guideline for closure of abdominal wall incisions from the European and American Hernia Societies. British Journal of Surgery, 109, 1239-1250. doi: 10.1093/bjs/znac302

Deerenberg, E. B., Harlaar, J. J., Steverberg, E. W., Lont, H. E., van Doorn, H. C., Heisterkamp, J., ... Bonjer, H. J. (2015). Small bites versus large bites for closure of abdominal midline incisions (STITCH): A double-blind, multicentre, randomized controlled trial. The Lancet, 386, 1254-1260. doi: 10.1016/S0140-6736(15)60459-7

DeNoto, G., 3rd, Ceppa, E. P., Pacella, S. J., Sawyer, M., Slayden, G., Takata, M., Tuma, G., & Yunis, J. (2022). 24-Month results of the BRAVO study: A prospective, multi-center study evaluating the clinical outcomes of a ventral hernia cohort treated with OviTex® 1S permanent reinforced tissue matrix. Annals of medicine and surgery (2012), 83, 104745. doi: 10.1016/j.amsu.2022.104745

East, B., Hill, S., Dames, N., Blackwell, S., Laidlaw, L., Gök, H., Stabilini, C., & de Beaux, A. (2021). Patient views

around their hernia surgery: a worldwide online survey promoted through social media. Frontiers in Surgery, 8, 769938. doi: 10.3389/fsurg.2021.769938

East, B., Pawlak, M., & de Beaux, A. C. (2020). A manual reduction of hernia under analgesia/sedation (Taxis) in the acute inguinal hernia: a useful technique in COVID-19 times to reduce the need for emergency surgery-a literature review. Hernia, 24(5), 937-941. doi: 10.1007/s10029-020-02227-1

East, B., Plencner, M., Otahal, M., Amler, E., & de Beaux, A. C. (2019). Dynamic creep properties of a novel nanofiber hernia mesh in abdominal wall repair. Hernia : the journal of hernias and abdominal wall surgery, 23(5), 1009–1015. doi: 10.1007/s10029-019-01940-w

East, B., Plencner, M., Kralovic, M., Rampichova, M., Sovkova, V., Vocetkova, K., Otahal, M., Tonar, Z., Kolinko, Y., Amler, E., & Hoch, J. (2018). A polypropylene mesh modified with poly-ε-caprolactone nanofibers in hernia repair: large animal experiment. International journal of nanomedicine, 13, 3129–3143. doi: 10.2147/IJN.S159480

East, B., Podda, M., Beznosková-Seydlová, M., & de Beaux, A. C. (2023). Exploring the link between poor oral hygiene and mesh infection after hernia repair: a systematic review and proposed best practices. Hernia : the journal of hernias and abdominal wall surgery, 27(6), 1387–1395. doi: 10.1007/s10029-023-02795-y

East, B., Woleský, J., Divín, R., Otáhal, M., Vocetková, K., Sovková, V., Blahnová, V.H., Koblížek, M., Kubový, P., Nečasová, A., Staffa, A., de Beaux, A.C., Lorenzová, J., & Amler, E. (2022). Liquid resorbable nanofibrous surgical mesh: a proof of a concept. Hernia, 26, 557-565. doi: 10.1007/s10029-022-02582-1.

European Society of Coloproctology (ESCP) collaborating group. (2023). An international assessment of surgeon practices in abdominal wound closure and surgical site infection prevention by the European Society for Coloproctology. Colorectal Disease. Advance online publication. doi: 10.1111/codi.16500

Fadaee N, Huynh D, Khanmohammed Z, Mazer L, Capati I and Towfigh S (2023) Patients With Systemic Reaction to Their Hernia Mesh: An Introduction to Mesh Implant Illness. J. Abdom. Wall Surg. 2:10983. doi: 10.3389/jaws.2023.10983

Gram-Hanssen, A., Tolstrup, A., Zetner, D., & Rosenberg, J. (2020). Patient-Reported Outcome Measures for Patients Undergoing Inguinal Hernia Repair. Frontiers in Surgery, 7, Article 17. doi: 10.3389/fsurg.2020.00017

Harji, D., Thomas, C., Antoniou, S. A., Chandraratan, H., Griffiths, B., Henniford, B. T., Horgan, L., Köckerling, F., López-Cano, M., Massey, L., Miserez, M., Montgomery, A., Muysoms, F., Poulose, B. K., Reinpold, W., & Smart, N.; NoSTRA HarMoNY. (2021). A systematic review of outcome reporting in incisional hernia surgery. BJS Open, 5(2), zrab006. doi: 10.1093/bjsopen/zrab006. PMID: 33839746; PMCID: PMC8038267.

Hart Collaborative. (2022). Incisional hernia following colorectal cancer surgery according to suture technique: Hughes Abdominal Repair Randomized Trial (HART). British Journal of Surgery, 109, 943–950. doi: 10.1093/bjs/znac198

Heniford, T. B., Walters, A. L., Lincourt, A. E., Novitsky, Y. W., Hope, W. W., & Kercher, K. W. (2008). Comparison of Generic Versus Specific Quality-of-Life Scales for Mesh Hernia Repairs. Journal of the American College of Surgeons, 206, 638-644. DOI: 10.1016/j.jamcollsurg.2007.11.025

HerniaSurge Group. (2018). International guidelines for groin hernia management. Hernia, 22(1), 1-165. doi: 10.1007/s10029-017-1668-x.

Israelsson, L. A., & Millbourn, D. (2013). Prevention of incisional hernias: how to close a midline incision. Surgical Clinics of North America, 93(5), 1027-1040. doi: 10.1016/j.suc.2013.06.009

Israelsson, L. A., & Jonsson, T. (1993, October). Suture length to wound length ratio and healing of midline laparotomy incisions. British Journal of Surgery, 80(10), 1284-1286. doi:10.1002/bjs.1800801020.

Jairam, A.P., López-Cano, M., Garcia-Alamino, J.M., Pereira, J.A., Timmermans, L., Jeekel, J., Lange, J., & Muysoms, F. (2020). Prevention of incisional hernia after midline laparotomy with prophylactic mesh reinforcement: a meta-analysis and trial sequential analysis. BJS Open, 4, 357–368. doi: 10.1002/bjs5.50261

Jenkins, T. P. (1976). The burst abdominal wound: a mechanical approach. British Journal of Surgery, 63, 873-876. doi: 10.1002/bjs.1800631110.

Jensen, K. K., East, B., Jisova, B., Cano, M. L., Cavallaro, G., Jørgensen, L. N., ... Berrevoet, F. (2022). The European Hernia Society Prehabilitation Project: A systematic review of patient prehabilitation prior to ventral hernia surgery. Hernia, 26(3), 715-726. doi: 10.1007/s10029-022-02573-2.

Jisova, B., Wolesky, J., Strizova, Z., de Beaux, A., & East, B. (2023). Autoimmunity and hernia mesh: fact or fiction?. Hernia 27, 741–749 (2023). doi: 10.1007/s10029-023-02749-4

Kehlet, H. (2008). Chronic pain after groin hernia repair. British Journal of Surgery, 95(2), 135-136. doi: 10.1002/bjs.6111

Klinge, U., & Klosterhalfen, B. (2012). Modified classification of surgical meshes for hernia repair based on the analyses of 1,000 explanted meshes. Hernia, 16, 251-258. doi: 10.1007/s10029-012-0913-6.

Klosterhalfen, B., Junge, K., & Klinge, U. (2005). The lightweight and large porous mesh concept for hernia repair. Expert Review of Medical Devices, 2, 103-117. doi: 10.1586/17434440.2.1.103.

Köckerling, F., Simon, T., Hukauf, M., Hellinger, A., Fortelny, R., Reinpold, W., & Bittner, R. (2018). The Importance of Registries in the Postmarketing Surveillance of Surgical Meshes. Annals of Surgery, 268, 1097-1104. doi:10.1097/SLA.0000000000002326.

Köckerling, F., Sheen, A. J., Berrevoet, F., Campanelli, G., Cuccurullo, D., Fortelny, R., Friis-Andersen, H., Gillion, J. F., Gorjanc, J., Kopelman, D., Lopez-Cano, M., Morales-Conde, S., Österberg, J., Reinpold, W., Simmermacher, R. K. J., Smietanski, M., Weyhe, D., & Simons, M. P. (2019). Accreditation and certification requirements for hernia centers and surgeons: the ACCESS project. Hernia, 23(2), 185-203. doi: 10.1007/s10029-018-1873-2

Köckerling, F., Alam, N. N., Antoniou, S. A., Daniels, I. R., Famiglietti, F., Fortelny, R. H., Heiss, M. M., Kallinowski, F., Kyle-Leinhase, I., Mayer, F., Miserez, M., Montgomery, A., Morales-Conde, S., Muysoms, F., Narang, S. K., Petter-Puchner, A., Reinpold, W., Scheuerlein, H., Smietanski, M., Stechemesser, B., … Smart, N. J. (2018). What is the evidence for the use of biologic or biosynthetic meshes in abdominal wall reconstruction?. Hernia : the journal of hernias and abdominal wall surgery, 22(2), 249–269. doi: 10.1007/s10029-018-1735-y

Krpata, D. M., Schmotzer, B. J., Flocke, S., Jin, J., Blatnik, J. A., Ermlich, B., Novitsky, Y. W., & Rosen, M. J. (2012). Design and initial implementation of HerQLes: a hernia-related quality-of-life survey to assess abdominal wall function. J Am Coll Surg, 215, 635-42. doi: 10.1016/j.jamcollsurg.2012.06.412

Lake, S. P., Ray, S., Zihni, A. M., Thompson, D. M., Gluckstein, J., & Deeken, C. R. (2015). Pore size and pore shape –

but not mesh density – alter the mechanical strength of tissue ingrowth and host tissue response to synthetic mesh materials in a porcine model of ventral hernia repair. Journal of the Mechanical Behavior of Biomedical Materials, 42, 186-197. doi: 10.1016/j.jmbbm.2014.11.011

Lichtenstein, I. L., Shulman, A. G., Amid, P. K., & Montllor, M. M. (1989). The tension-free hernioplasty. American Journal of Surgery, 157(2), 188-193.

Liu, W., Xie, Y., Zheng, Y., He, W., Qiao, K., & Meng, H. (2020). Regulatory science for hernia mesh: Current status and future perspectives. Bioactive Materials, 6, 420-432. doi: 10.1016/j.bioactmat.2020.08.021.

Luijendijk, R. W., Hop, W. C., van den Tol, M. P., de Lange, D. C., Braaksma, M. M., IJzermans, J. N., ... Jeekel, J. (2000). A comparison of suture repair with mesh repair for incisional hernia. New England Journal of Medicine, 343(6), 392-398. doi: 10.1056/NEJM200008103430603

Malik, A., Macdonald, A. D. H., de Beaux, A. C., & Tulloh, B. R. (2014). The peritoneal flap hernioplasty for repair of large ventral and incisional hernias. Hernia, 18, 39-45. doi: 10.1007/s10029-013-1086-7

Mauch, J. T., Enriquez, F. A., Shea, J. A., Barg, F. K., Rhemtulla, I. A., Broach, R. B., ... Fischer, J. P. (2020). The Abdominal Hernia-Q: Development, Psychometric Evaluation, and Prospective Testing. Annals of Surgery, 271(5), 949-957. doi:10.1097/SLA.0000000000003144.

Meadows, K. A. (2011). Patient-reported outcome measures: An overview. British Journal of Community Nursing, 16(3), 146.

Melman, L., Jenkins, E. D., Hamilton, N. A., et al. (2011). Early biocompatibility of crosslinked and non-crosslinked biologic meshes in a porcine model of ventral hernia repair. Hernia, 15, 157-164. doi: 10.1007/s10029-010-0770-0.

Millbourn, D., Cengiz, Y., & Israelsson, L. A. (2009). Effect of Stitch Length on Wound Complications After Closure of Midline Incisions: A Randomized Controlled Trial. Archives of Surgery, 144(11), 1056-1059. doi:10.1001/archsurg.2009.189

Muysoms, F. E., Antoniou, S. A., Bury, K., Campanelli, G., Conze, J., Cuccurullo, D., ... Berrevoet, F.; European Hernia Society. (2015). European Hernia Society guidelines on the closure of abdominal wall incisions. Hernia, 19, 1-24. doi: 10.1007/s10029-014-1342-5.

National Audit of Small Bowel Obstruction Steering Group and National Audit of Small Bowel Obstruction Collaborators, NASBO Steering Group, NASBO Collaborators, West Midlands Research Collaborative. (2020). Outcomes of obstructed abdominal wall hernia: results from the UK national small bowel obstruction audit. BJS Open, 4, 924-934. doi: 10.1002/bjs5.50315

Naraynsingh, V., Maharaj, R., Dan, D., & Hariharan, S. (2012). Strong linea alba: myth or reality? Medical Hypotheses, 78, 291-292. doi: 10.1016/j.mehy.2011.11.004.

Nguyen, T. M., Rajendran, S., Brown, K. G. M., Saha, P., & Qasabian, R. (2020). Incisional Hernia Following Open Abdominal Aortic Aneurysm Repair: A Contemporary Review of Risk Factors and Prevention. Vascular & Endovascular Review, 3, e01. doi: 10.15420/ver.2019.01.R1.

NHS Digital. (2017). Finalised Patient Reported Outcome Measures (PROMs) in England for groin hernia and

varicose vein procedures: April 2016 to March 2017. https://digital.nhs.uk/data-and-information/publications/statistical/patient-reported-out come-measures-proms/finalised-patient-reported-outcome-measures-proms-in-engla nd-for-groin-hernia-and-varicose-vein-procedures-april-2016-to-march-2017

Nielsen, M. F., de Beaux, A., & Tulloh, B. (2019). Peritoneal Flap Hernioplasty for Reconstruction of Large Ventral Hernias: Long-Term Outcome in 251 Patients. World Journal of Surgery, 43, 2157-2163. doi: 10.1007/s00268-019-05011-0

Nielsen, M. F., de Beaux, A., Damaskos, D., & Tulloh, B. (2019). Peritoneal flap hernioplasty for reconstruction of transverse incisional hernias. Hernia: The Journal of Hernias and Abdominal Wall Surgery, 25, 313-319. doi: 10.1007/s10029-019-02099-0

Novitsky, Y.W., Elliott, H.L., Orenstein, S.B., & Rosen, M.J. (2012). Transversus abdominis muscle release: a novel approach to posterior component separation during complex abdominal wall reconstruction. American Journal of Surgery, 204, 709-716. DOI: 10.1016/j.amjsurg.2012.02.008.

Oprea, V., Radu, V. G., & Moga, D. (2016). Transversus Abdominis Muscle Release (TAR) for Large Incisional Hernia Repair. Chirurgia (Bucur), 111, 535-540. doi: 10.21614/chirurgia.111.6.535.

Plencner, M., Prosecká, E., Rampichová, M., East, B., Buzgo, M., Vysloužilová, L., Hoch, J., & Amler, E. (2015). Significant improvement of biocompatibility of polypropylene mesh for incisional hernia repair by using poly-ε-caprolactone nanofibers functionalized with thrombocyte-rich solution. International journal of nanomedicine, 10, 2635–2646. doi: 10.2147/IJN.S77816

Plencner, M., East, B., Tonar, Z., Otáhal, M., Prosecká, E., Rampichová, M., Krejčí, T., Litvinec, A., Buzgo, M., Míčková, A., Nečas, A., Hoch, J., & Amler, E. (2014). Abdominal closure reinforcement by using polypropylene mesh functionalized with poly-ε-caprolactone nanofibers and growth factors for prevention of incisional hernia formation. International journal of nanomedicine, 9, 3263–3277. doi: 10.2147/IJN.S63095

Pawlak, M., East, B., & de Beaux, A. C. (2021). Algorithm for management of an incarcerated inguinal hernia in the emergency settings with manual reduction. Taxis, the technique and its safety. Hernia, 25(5), 1253-1258. doi: 10.1007/s10029-021-02429-1

Petersson, P., Montgomery, A., & Petersson, U. (2020). Modified Peritoneal Flap Hernioplasty Versus Retromuscular Technique for Incisional Hernia Repair: a Retrospective Cohort Study. Scandinavian Journal of Surgery, 109, 279-288. doi: 10.1177/1457496919863943.

Ramirez, O. M., Ruas, E., & Dellon, A. L. (1990). "Components separation" method for closure of abdominal-wall defects: an anatomic and clinical study. Plast Reconstr Surg, 86, 519-26. doi: 10.1097/00006534-199009000-00023

Rives, J., Lardennois, B., Pire, J. C., & Hibon, J. (1973). Les grandes éventrations. Importance du volet abdominal et des troubles respiratoires qui lui sont secondaires. Chirurgie, 99, 547–563.

Rosen, M. J., Krpata, D. M., Petro, C. C., et al. (2022). Biologic vs Synthetic Mesh for Single-stage Repair of Contaminated Ventral Hernias: A Randomized Clinical Trial. JAMA Surgery, 157(4), 293–301. doi:10.1001/jamasurg.2021.6902

Roth, J. S., Anthone, G. J., Selzer, D. J., Poulose, B. K., Pierce, R. A., Bittner, J. G., ... Voeller, G. R. (2021). Prospective, multicenter study of P4HB (Phasix™) mesh for hernia repair in cohort at risk for complications: 3-Year follow-up.

Annals of Medicine and Surgery, 61, 1-7. doi: 10.1016/j.amsu.2020.12.002

Ruiz-Jasbon, F., Norrby, J., Ivarsson, M. L., & Björck, S. (2014). Inguinal hernia repair using a synthetic long-term resorbable mesh: Results from a 3-year prospective safety and performance study. Hernia, 18(5), 723-730. doi: 10.1007/s10029-014-1249-1.105. Sabih, Q., Cappuccino, H., Edge, S., Takabe, K., & Young, J. (2023). Burnout in the women surgical trainee; is it time to consider a more global approach to tackle this issue? Surgery in Practice and Science, 100162. doi: 10.1016/j.sipas.2023.100162

Sanders, D. L., & Kingsnorth, A. N. (2012). From ancient to contemporary times: a concise history of incisional hernia repair. Hernia : the journal of hernias and abdominal wall surgery, 16(1), 1–7. doi: 10.1007/s10029-011-0870-5

Sanders, D. L., Pawlak, M. M., Simons, M. P., Aufenacker, T., Balla, A., Berger, C., Berrevoet, F., de Beaux, A. C., East, B., Henriksen, N. A., Klugar, M., Langaufová, A., Miserez, M., Morales-Conde, S., Montgomery, A., Pettersson, P. K., Reinpold, W., Renard, Y., Slezáková, S., Whitehead-Clarke, T., … Stabilini, C. (2023). Midline incisional hernia guidelines: the European Hernia Society. The British journal of surgery, 110(12), 1732–1768. doi: 10.1093/bjs/znad284

Scrimgeour, D.S.G., Allan, M., Knight, S.R. et al. (2022). A modified Delphi process to establish research priorities in hernia surgery. Hernia, 26, 751-759. doi: 10.1007/s10029-021-02519-0

Schlosser, K. A., Maloney, S. R., Gbozah, K., Prasad, T., Colavita, P. D., Augenstein, V. A., & Heniford, B. T. (2020). The impact of weight change on intra-abdominal and hernia volumes. Surgery, 167, 876-882. doi: 10.1016/j.surg.2020.01.007

da Silva, L. A. (1979). Surgical correction of longitudinal median and paramedian incisional hernia. Surgery, Gynecology & Obstetrics, 148, 579–583.

Stoppa, R., Moungar, F., & Verhaeghe, P. (1992). Traitement chirurgical des éventrations médianes sus ombilicales. Journal de Chirurgie, 129, 335–343.

Theodorou, A., Banysch, M., Gok, H., Deerenberg, E.B., Kalff, J.C., & von Websky, M.W. (2022). Don’t fear the (small) bite: a narrative review of the rationale and misconceptions surrounding closure of abdominal wall incisions. Frontiers in Surgery, 9. doi: 10.3389/fsurg.2022.1002558

Tse, G. H., Stutchfield, B. M., Duckworth, A. D., de Beaux, A. C., & Tulloh, B. (2010). Pseudo-recurrence following laparoscopic ventral and incisional hernia repair. Hernia, 14, 583-587. doi: 10.1007/s10029-010-0709-5

Appendix - List of attachments

East, B., Hill, S., Dames, N., Blackwell, S., Laidlaw, L., Gök, H., Stabilini, C., & de Beaux, A. (2021). Patient views around their hernia surgery: a worldwide online survey promoted through social media. Frontiers in Surgery, 8, 769938

Jisova, B., Wolesky, J., Strizova, Z., de Beaux, A., & East, B. (2023). Autoimmunity and hernia mesh: fact or fiction?. Hernia : the journal of hernias and abdominal wall surgery, 10.1007/s10029-023-02749-4.

East, B., Woleský, J., Divín, R., Otáhal, M., Vocetková, K., Sovková, V., Blahnová, V.H., Koblížek, M., Kubový, P., Nečasová, A., Staffa, A., de Beaux, A.C., Lorenzová, J., & Amler, E. (2022). Liquid resorbable nanofibrous surgical mesh: a proof of a concept. Hernia, 26, 557-565.

Sanders, D. L., Pawlak, M. M., Simons, M. P., Aufenacker, T., Balla, A., Berger, C., Berrevoet, F., de Beaux, A. C., East, B., Henriksen, N. A., Klugar, M., Langaufová, A., Miserez, M., Morales-Conde, S., Montgomery, A., Pettersson, P. K., Reinpold, W., Renard, Y., Slezáková, S., Whitehead-Clarke, T., … Stabilini, C. (2023). Midline incisional hernia guidelines: the European Hernia Society. The British journal of surgery, 110(12), 1732–1768.

Jensen KK, East B, Jisova B, Cano ML, Cavallaro G, Jørgensen LN, Rodrigues V, Stabilini C, Wouters D, Berrevoet F. The European Hernia Society Prehabilitation Project: a systematic review of patient prehabilitation prior to ventral hernia surgery. Hernia. 2022;26(3):715-726.

East, B., Podda, M., Beznosková-Seydlová, M., & de Beaux, A. C. (2023). Exploring the link between poor oral hygiene and mesh infection after hernia repair: a systematic review and proposed best practices. Hernia : the journal of hernias and abdominal wall surgery, 10.1007/s10029-023-02795-y. Advance online publication.

East, B., Pawlak, M., & de Beaux, A. C. (2020). A manual reduction of hernia under analgesia/sedation (Taxis) in the acute inguinal hernia: a useful technique in COVID-19 times to reduce the need for emergency surgery-a literature review. Hernia, 24(5), 937-941.

de Beaux, A., Becker, S., Parent, T., Temporal, G., Kummer, R., Allouard, C., East, B. (2023). Hernia Basecamp- a free to use, online hernia learning platform. Analysis of its use since launch in June 2021. J. Abdom. Wall Surg. 2:11803.

Komentované práce

1. East B, Hill S, Dames N, Blackwell S, Laidlaw L, Gök H, Stabilini C, de Beaux A. Patient Views Around Their Hernia Surgery: A Worldwide Online Survey Promoted Through Social Media. Front Surg. 2021 Dec 24;8:769938. doi: 10.3389/fsurg.2021.769938. PMID: 35004837; PMCID: PMC8739190.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8739190/

2. Jisova B, Wolesky J, Strizova Z, de Beaux A, East B. Autoimmunity and hernia mesh: fact or fiction? Hernia. 2023 Aug;27(4):741-749. doi: 10.1007/s10029-023-02749-4. Epub 2023 Feb 4. PMID: 36739352; PMCID: PMC10374482.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10374482/

3. East B, Woleský J, Divín R, Otáhal M, Vocetková K, Sovková V, Blahnová VH, Koblížek M, Kubový P, Nečasová A, Staffa A, de Beaux AC, Lorenzová J, Amler E. Liquid resorbable nanofibrous surgical mesh: a proof of a concept. Hernia. 2022 Apr;26(2):557-565. doi: 10.1007/s10029-022-02582-1. Epub 2022 Apr 4. PMID: 35377083.
https://pubmed.ncbi.nlm.nih.gov/35377083/

4. Sanders DL, Pawlak MM, Simons MP, Aufenacker T, Balla A, Berger C, Berrevoet F, de Beaux AC, East B, Henriksen NA, Klugar M, Langaufová A, Miserez M, Morales-Conde S, Montgomery A, Pettersson PK, Reinpold W, Renard Y, Slezáková S, Whitehead-Clarke T, Stabilini C. Midline incisional hernia guidelines: the European Hernia Society. Br J Surg. 2023 Nov 9;110(12):1732-1768. doi: 10.1093/bjs/znad284. Erratum in: Br J Surg. 2024 Jan 3;111(1):znad349. doi: 10.1093/bjs/znad349. PMID: 37727928; PMCID: PMC10638550.
https://pubmed.ncbi.nlm.nih.gov/37727928/

5. Jensen KK, East B, Jisova B, Cano ML, Cavallaro G, Jørgensen LN, Rodrigues V, Stabilini C, Wouters D, Berrevoet F. The European Hernia Society Prehabilitation Project: a systematic review of patient prehabilitation prior to ventral hernia surgery. Hernia. 2022 Jun;26(3):715-726. doi: 10.1007/s10029-022-02573-2. Epub 2022 Feb 25. PMID: 35212807.
https://pubmed.ncbi.nlm.nih.gov/35212807/

6. East B, Podda M, Beznosková-Seydlová M, de Beaux AC. Exploring the link between poor oral hygiene and mesh infection after hernia repair: a systematic review and proposed best practices. Hernia. 2023 Dec;27(6):1387-1395. doi: 10.1007/s10029-023-02795-y. Epub 2023 May 19. PMID: 37204529; PMCID: PMC10700451.
https://pubmed.ncbi.nlm.nih.gov/37204529/

7. East B, Pawlak M, de Beaux AC. A manual reduction of hernia under analgesia/sedation (Taxis) in the acute inguinal hernia: a useful technique in COVID-19 times to reduce the need for emergency surgery-a literature review. Hernia. 2020 Oct;24(5):937-941. doi: 10.1007/s10029-020-02227-1. Epub 2020 May 29. PMID: 32472464; PMCID: PMC7258608.
https://pubmed.ncbi.nlm.nih.gov/32472464/

8. de Beaux A, Becker S, Parent T, Temporal G, Kummer R, Allouard C, East B. Hernia Basecamp-A Free to Use, Online Hernia Learning Platform. Analysis of Its Use Since Launch in June 2021. J Abdom Wall Surg. 2023 Sep 29;2:11803. doi: 10.3389/jaws.2023.11803. PMID: 38312406; PMCID: PMC10831634.
https://pubmed.ncbi.nlm.nih.gov/38312406/