

©Borgis

*Piotr Golaszewski¹, Paulina Wozniowska¹, Justyna Dawidowska², Patrycja Pawluszewicz¹, Maria Soldatow², Martyna Wyszynska¹, Hady Razak Hady¹

Incisional hernia – clinical characteristics, diagnosis and treatment

Przepukliny pooperacyjne – obraz kliniczny, diagnostyka i leczenie

¹st Department of General and Endocrine Surgery, University Clinical Hospital in Białystok, Poland

²Pediatric Department of Pro-Medica Hospital in Elk, Poland

Keywords

incisional hernia, surgery complications, surgery treatment

Słowa kluczowe

przepukliny pooperacyjne, powikłania chirurgiczne, leczenie chirurgiczne

Conflict of interest

Konflikt interesów

None

Brak konfliktu interesów

Address/adres:

*Piotr Golaszewski

¹st Department of General

and Endocrine Surgery

University Clinical Hospital in Białystok

24A M. Skłodowskiej-Curie Str.,

15-276 Białystok, Poland

Phone: +48 (85) 831-86-72

E-mail: p.golaszewski27@gmail.com

Summary

Postoperative hernias are long-term complications of surgical procedures performed within the abdominal cavity. Their incidence is estimated at around 20%.

Postoperative hernia hold a special place in abdominal surgery due to the high incidence and recurrence. The European Hernia Society (EHS) recommends the classification of postoperative hernia based on: the character of hernia (primary/relapsing), location, size and risk factors for relapse. The available literature indicates many factors leading to the development of hernia, including co-morbidities that impair postoperative wound healing, diseases with elevated intraabdominal pressure or improper surgical techniques. The symptoms of postoperative hernias include pain, cosmetic defect (protruding hernia sac) and discomfort. The only effective way of postoperative hernia treatment is reconstructive surgery, that includes several repair techniques. Scientific studies show a higher efficacy of mesh repair methods over procedures based on tension suture techniques.

The following article contains an overview of data and literature on epidemiology, pathogenesis, clinical characteristic and treatment of incisional hernia.

Streszczenie

Przepukliny pooperacyjne zaliczamy do odległych powikłań zabiegów operacyjnych przeprowadzanych w obrębie jamy brzusznej. Częstość ich występowania szacuje się na około 20%.

Przepukliny w bliźnie pooperacyjnej zajmują szczególne miejsce w chirurgii jamy brzusznej ze względu na dużą częstość występowania oraz nawrotowość. European Hernia Society (EHS) zaleca klasyfikację przepuklin pooperacyjnych w oparciu o: charakter przepukliny (pierwotna/nawrotowa), lokalizację, wielkość oraz czynniki ryzyka nawrotu schorzenia. W literaturze możemy odnaleźć wiele czynników sprzyjających powstawaniu przepuklin, m.in. choroby współistniejące opóźniające gojenie ran pooperacyjnych, stany przebiegające z podwyższonym ciśnieniem wewnątrzbrzusznym, nieprawidłowa technika chirurgiczna. Objawami, na które zwracają uwagę autorzy publikacji, są: ból, dolegliwości natury kosmetycznej (wystający worek przepuklinowy) i uczucie dyskomfortu. Jedyną skuteczną metodą leczenia jest zabieg naprawczy. Istnieje kilka technik plastyki przepuklin pooperacyjnych. Opracowania naukowe wykazują wyższą skuteczność operacji z użyciem siatek nad zabiegami polegającymi na samym zszyciu wrót przepukliny. Niniejszy artykuł zawiera przegląd danych oraz piśmiennictwa na temat epidemiologii, patogenezy, obrazu klinicznego oraz leczenia przepuklin pachwinowych.

INTRODUCTION

Postoperative hernias are a frequent and costs generating complication of surgical procedures performed within the abdominal cavity (1). According to the European Hernia Society (EHS) postoperative hernias should be considered as any space in the abdominal wall accompanied by or without a bulge, perceptible or palpable on examination, detected by imaging studies within the postoperative scar (2, 3). This complication

applies to both operations performed using classical and laparoscopic techniques.

REVIEW

Epidemiology

The incidence of hernias depends largely on the location of the surgical incision, experience of the surgeon and the type and scope of the operation being performed. Postoperative hernias are most often located

in place of the scar after a median laparotomy. Studies show a wide discrepancy in the incidence of postoperative hernia. This complication may occur in 9 to 20% of operations performed in the abdominal cavity (4, 5). More than half of hernias in the postoperative scar is diagnosed within the first year after surgery (6).

Classification

EHS recommends that the following parameters should be used for the classification of postoperative hernia: location of the defect, size (length and width) and whether it is a primary or recurrent hernia (fig. 1-4) (2).

In the literature, other classifications of postoperative hernia are available, including morphological classification of postoperative hernias (p / rxM ... S ... x ... RF ...):

- the character of hernia (p / rx) - primary / relapsing (x-number of relapses),

EHS Incisional Hernia Classification			
Midline	subxiphoidal	M1	
	epigastric	M2	
	umbilical	M3	
	infraumbilical	M4	
	suprapubic	M5	
Lateral	subcostal	L1	
	flank	L2	
	iliac	L3	
	lumbar	L4	
Recurrent incisional hernia?		Yes <input type="radio"/>	No <input type="radio"/>
length:		cm	width: cm
Width cm	W1	W2	W3
	< 4 cm <input type="radio"/>	≥ 4-10 cm <input type="radio"/>	≥ 10 cm <input type="radio"/>

Fig. 1. European Hernia Society classification for incisional abdominal wall hernias (2)

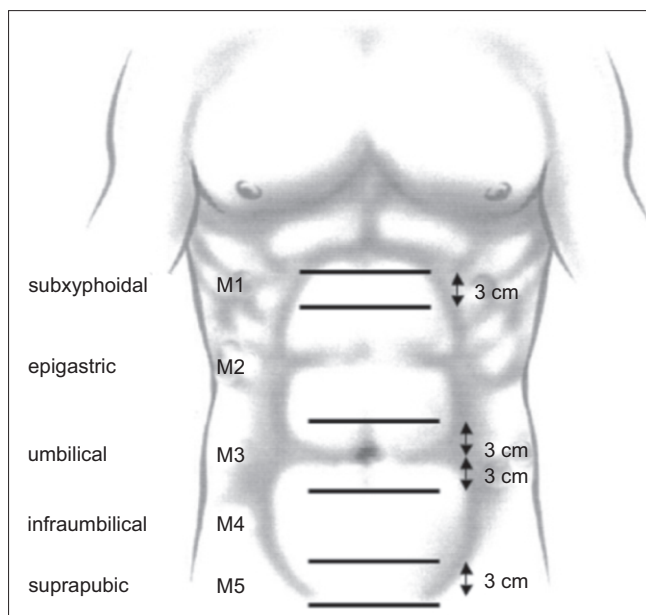


Fig. 2. To classify midline incisional hernias between the two lateral margins of the rectus muscle sheaths, five zones were defined (2)

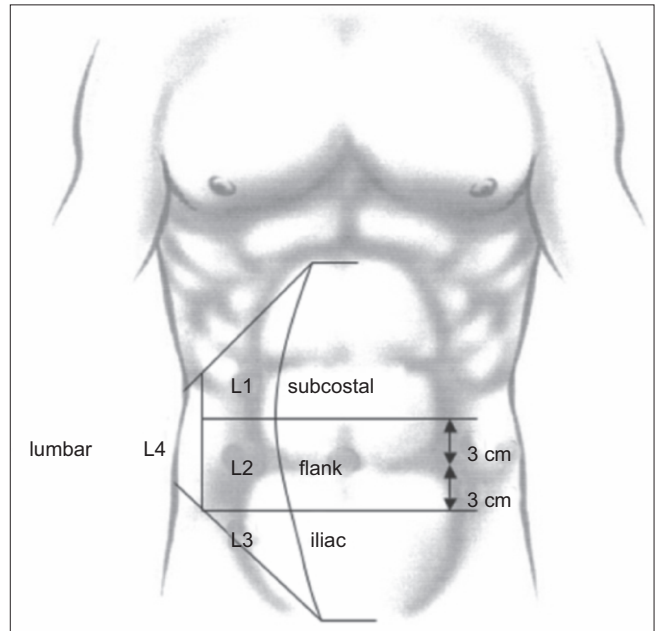


Fig. 3. To classify lateral incisional hernias, four zones lateral of the rectus muscle sheaths were defined (2)

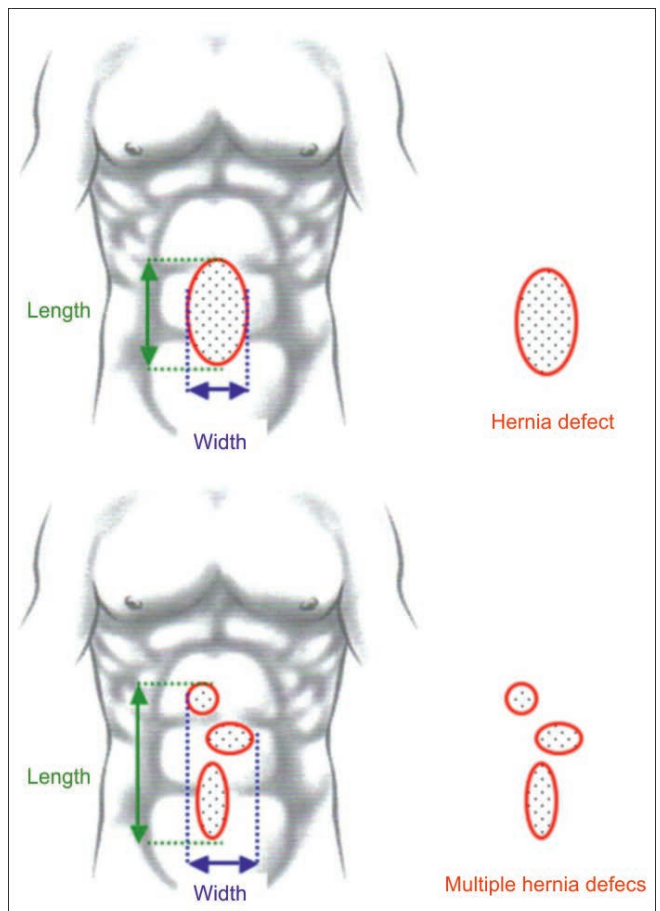


Fig. 4. Definition of the width and the length of incisional hernias for single hernia defects and multiple hernia defects (2)

- location (M) - medial (m), periocepal (u), supra-pubic (sp), medial with narrow subcostal angle (m + sc), transcostal (sc), transverse (t), lumbar (l), medial (pm),

- size (S) [cm] - length x width,
- risk factors for relapse + for each factor (RF) - obesity (BMI > 25), male gender, nicotine use, operative wound contamination, age > 45 years, basic disease, 2 interventions within a month or > 2 within 1 year, complications during the postoperative period (7).

Clinical characteristics

The most common postoperative symptom is painless bulging of the abdomen in the area of the surgical incision site (e.g. when coughing), which regresses in the recumbent position (6) (fig. 5, 6). The first appearance

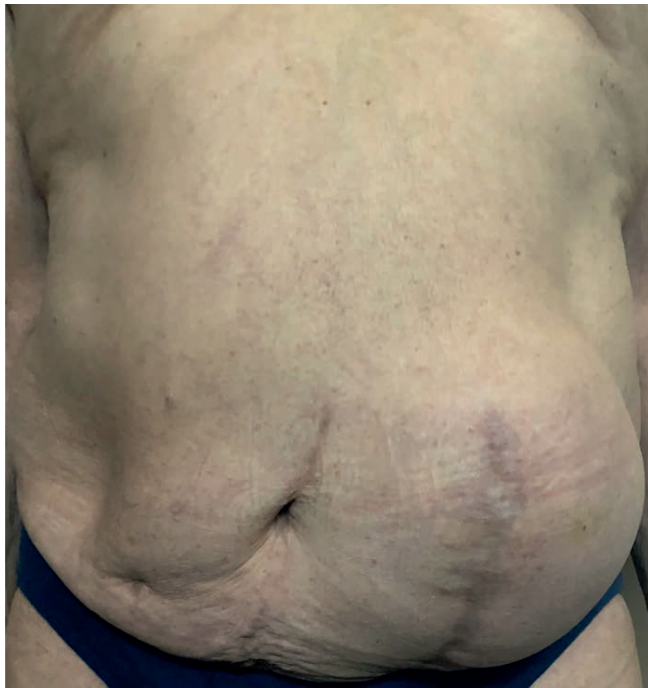


Fig. 5. Incisional hernia after left-sided hemicolectomy



Fig. 6. Umbilical hernia and incisional hernia after cesarean section

of a hernia is usually associated with dynamic physical effort (increased intra-abdominal pressure). Such an incidence occurs when accompanied by a sudden, intense, short-lasting pain in the area of the resulting area. Other symptoms of uncomplicated hernias may be associated with discomfort in the abdominal cavity, tension, burning sensation within the hernia. Pain and symptoms of gastrointestinal obstruction may indicate hernia complications – obstruction or strangulation. In addition to standard physical examination the physician's duty is to carefully examine the hernia: assessment of the loss of the abdominal wall (especially when preparing for IPOM) and hernia sac as well as careful attempt to drain its contents (8). Hernia examination should be conducted in a lying position, while standing and after performing the Valsalva maneuver.

Diagnostics of postoperative hernias may be supplemented with imaging examinations. The best diagnostic imaging for hernias is computer tomography, other useful imaging procedures are: ultrasonography (used in the diagnosis of hernia in children) and magnetic resonance imaging (9). Patients with suspected morbidity should be promptly informed hospitalized and subjected to urgent corrective surgery.

Pathomechanism of formation

Incisional hernias are the result of the separation of the muscle and fascia. Risk factors contributing to hernia formation:

- incorrect technique of supplying the surgical wound – for example, too long distances between sutures, extensive tension within the cavity being worked on using rapidly absorbable sutures (10),
- local complications of wound healing – postoperative wound infection (11), hematomas, serovars,
- type of surgical incision – laparotomy performed by mid-cut gives the highest percentage of hernias among all surgical approaches within the cavity abdominal,
- general condition of the patient unfavorable to normal wound healing – poor-controlled diabetes, malnutrition, obesity, advanced age (4), neoplastic diseases,
- abnormalities in the structure of connective tissue,
- drugs – glucocorticoids and stimulants – smoking (12),
- states associated with elevated intra-abdominal pressure: chronic cough (patients suffering from COPD, asthma, bronchiectasis, GERD), chronic constipation, vomiting, ascites, excessive physical exertion, postoperative intestinal obstruction, obesity.

The elimination or optimization of the above-mentioned factors contributes significantly to reduction of postoperative hernia incidence. Scientific research proves a reduction in the incidence of postoperative hernias using a mesh as a reinforcement for suture line (13-15).

Methods of treatment

The only form of postoperative hernia treatment is reconstructive surgery. Observational attempts result in

a frequent risk of urgent surgery – obstruction, strangulation. Such a procedure creates a much higher risk of complications due to corrective surgery, i.e. perforation, fistula, perioperative death (16). The procedure itself requires precise knowledge of the anatomy of the abdominal wall and the surgeon's experience. There are several techniques of postoperative hernia repair. The first is by simple stitching caused by a hernia. This is the method with the greatest risk of hernia recurrence. The relapse rate is estimated at approximately 63% (17).

Other methods use different types of meshes to strengthen the seam line. Research proved that the use of a mesh in hernia operations reduces the risk of recurrence to 32% (17, 18).

The following types of meshes are used in surgery:

- synthetic meshes:
 - polypropylene meshes – are characterized by fast ingrowth of connective tissue elements in, which in a very short time integrate with the surrounding tissues, placement of the mesh in contact with, for example, the small intestine may cause adhesions to develop further and may contribute to the development of e.g. intestinal obstruction,
 - polyester meshes,
 - polates made of polytetrafluoroethylene (PTFE) – their advantage is the possibility of using the mesh within the intraabdominal cavity – they do not cause adhesions, similar properties have composites meshes (combination of synthetic material and anti-adhesion substitutes) (19),
 - biodegradable meshes – for example polyglycolic or polyglactin,
- biological meshes – made of cell-free collagen, using biological meshes is associated with a lower incidence of complications due to infection, they are best used in patients at high risk of surgical wound infection (20), the greatest disadvantage of meshes from this material is their price (21, 22).

Contemporary surgery has several techniques for hernia repair surgery. The main differences are dictated by the location of the mesh. Types of mesh placement:

- onlay (overlay) – a mesh is located anterior to the muscular layer of the abdominal wall (fig. 7),
- sublay – the mesh is located anterior to the transverse fascia or anterior to the posterior wall of the rectus abdominis muscle sheath (fig. 8),
- underlay, IPOM (intraperitoneal onlay mesh) – a mesh is located intraperitoneally (fig. 9).



Fig. 7. Overlay mesh location (23)

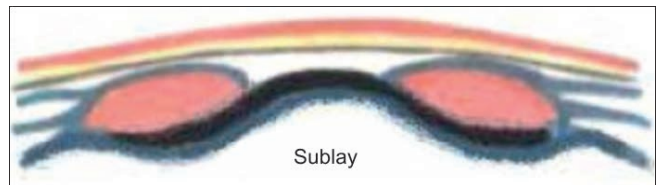


Fig. 8. Sublay mesh location (23)



Fig. 9. Intraperitoneal mesh location (23)

Comparison of onlay and sublay techniques has shown a greater frequency of recurrence and greater chance of infection in the case of placing the mesh anterior to the straight abdominal muscles (24, 25). Sublay operations and IPOM are possible to perform with both classic and laparoscopic techniques. Comparison of both techniques show similar efficacy in terms of hernia recurrence and similar time of hospitalization. The minimally invasive technique is characterized by a lower frequency of local infection, but longer duration of surgery (26-28). In the case of large hernia treatment, the component separation technique may be used (29, 30).

CONCLUSIONS

Treatment of postoperative hernia is huge challenge for surgeons. If risk factors are reduced to a minimum the chance of hernia formation decreases. However, modern surgical techniques allow the possibility of repairing the defect. Nevertheless, further research should be conducted with the aim to find answers to the following questions: how to reduce the incidence of postoperative hernias and how to reduce the frequency of hernia recurrence after corrective surgery.

BIBLIOGRAPHY

1. Poulouse BK, Shelton J, Phillips S et al.: Epidemiology and cost of ventral hernia repair: making the case for hernia research. *Hernia* 2012; 16: 179-183.
2. Muysoms FE, Miserez M, Berrevoet F et al.: Classification of primary and incisional abdominal wall hernias. *Hernia* 2009; 13(4): 407-414.
3. Korenkov M, Paul A, Sauerland S et al.: Classification and surgical treatment of incisional hernia. Results of an experts' meeting. *Langenbecks Arch Surg* 2001; 386(1): 65-73.
4. Van't Riet M, Steyerberg EW, Nellensteyn J et al.: Meta-analysis of techniques for closure of midline abdominal incisions. *Br J Surg* 2002; 89: 1350-1361.

5. Fortelny RH, Baumann P, Thasler WE et al.: Effect of suture technique on the occurrence of incisional hernia after elective midline abdominal wall closure: study protocol for a randomized controlled trial. *Trials* 2015; 16: 52.
6. Ah-kee EY, Kallachil T, O'Dwyer PJ: Patient awareness and symptoms from an incisional hernia. *Int Surg* 2014; 99(3): 241-246.
7. Dietz UA, Hamelmann W, Winkler MS et al.: An alternative classification of incisional hernias enlisting morphology, body type and risk factors in the assessment of prognosis and tailoring of surgical technique. *J Plast Reconstr Aesthet Surg* 2007; 60: 383-388.
8. Mitura K: Different approach to laparoscopic IPOM ventral hernia surgery – what has the last decade taught us? *Pol Przegl Chir* 2016; 88(1): 54-61.
9. Murphy KP, O'Connor OJ, Maher MM: Adult abdominal hernias. *Am J Roentgenol* 2014; 202(6): W506-W511.
10. Muysoms FE, Antoniou SA, Bury K et al.: European Hernia Society. European Hernia Society guidelines on the closure of abdominal wall incisions. *Hernia* 2015; 19(1): 1-24.
11. Murray BW, CIPHER DJ, Pham T et al.: The impact of surgical site infection on the development of incisional hernia and small bowel obstruction in colorectal surgery. *Am J Surg* 2011; 202(5): 558-560.
12. Sørensen LT, Hemmingsen UB, Kirkeby LT et al.: Smoking Is a Risk Factor for Incisional Hernia. *Arch Surg* 2005; 140(2): 119-123.
13. Indrakusuma R, Jalalzadeh H, van der Meij JE et al.: Prophylactic Mesh Reinforcement versus Sutured Closure to Prevent Incisional Hernias after Open Abdominal Aortic Aneurysm Repair via Midline Laparotomy: A Systematic Review and Meta-Analysis. *Eur J Vasc Endovasc Surg* 2018; 56(1): 120-128.
14. Brosi P, Glauser PM, Speich B et al.: Prophylactic Intraperitoneal Onlay Mesh Reinforcement Reduces the Risk of Incisional Hernia, Two-Year Results of a Randomized Clinical Trial. *World J Surg* 2018; 42(6): 1687-1694.
15. Llaguna OH, Avgerinos DV, Nagda P et al.: Does Prophylactic Biologic Mesh Placement Protect Against the Development of Incisional Hernia in High-risk Patients? *World J Surg* 2011; 35: 1651-1655.
16. Verhelst J, Timmermans L, van de Velde M et al.: Watchful waiting in incisional hernia: is it safe? *Surgery* 2015; 157(2): 297-303.
17. Burger JWA, Luijendijk RW, Hop WCJ et al.: Long-term Follow-up of a Randomized Controlled Trial of Suture Versus Mesh Repair of Incisional Hernia. *Ann Surg* 2004; 240(4): 578-585.
18. Sugerma HJ, Kellum JM Jr, Reines HD et al.: Greater risk of incisional hernia with morbidly obese than steroid-dependent patients and low recurrence with prefascial polypropylene mesh. *Am J Surg* 1996; 171(1): 80-84.
19. Stetsko T, Bury K, Lubowiecka I et al.: Safety and efficacy of a Ventralight ST echo ps implant for a laparoscopic ventral hernia repair – a prospective cohort study with a one-year follow-up. *Pol Przegl Chir* 2016; 88(1): 7-14.
20. Darehzereshki A, Goldfarb M, Zehetner J et al.: Biologic versus nonbiologic mesh in ventral hernia repair: a systematic review and meta-analysis. *World J Surg* 2014; 38(1): 40-50.
21. Rastegarpour A, Cheung M, Vardhan M et al.: Surgical mesh for ventral incisional hernia repairs: Understanding mesh design. *Plast Surg (Oakv)* 2016; 24(1): 41-50.
22. Bilsel Y, Abci I: The search for ideal hernia repair; mesh materials and types. *Int J Surg* 2012; 10(6): 317-321.
23. Bougard H, Coolen D, de Beer R et al.: HIG (SA) Guidelines for the management of ventral hernias. *S Afr J Surg [Internet]* 2016; 54(4): 1-32.
24. Timmermans L, de Goede B, van Dijk SM et al.: Meta-analysis of sublay versus onlay mesh repair in incisional hernia surgery. *Am J Surg* 2014; 207(6): 980-988.
25. Holihan JL, Nguyen DH, Nguyen MT et al.: Mesh location in open ventral hernia repair: a systematic review and network meta-analysis. *World J Surg* 2016; 40(1): 89-99.
26. Al Chalabi H, Larkin J, Mehigan B et al.: A systematic review of laparoscopic versus open abdominal incisional hernia repair, with meta-analysis of randomized controlled trials. *Int J Surg* 2015; 20: 65-74.
27. Froylich D, Segal M, Weinstein A et al.: Laparoscopic versus open ventral hernia repair in obese patients: a long-term follow-up. *Surg Endosc* 2016; 30(2): 670-675.
28. Eker HH, Hansson BME, Buunen M et al.: Laparoscopic vs Open Incisional Hernia Repair A Randomized Clinical Trial. *JAMA Surg* 2013; 148(3): 259-263.
29. Ratajczak A, Bobkiewicz A, Mitura K et al.: Posterior component separation – first report from Poland on new surgical technique used in major abdominal hernia treatment. *Pol Przegl Chir* 2016; 88(2): 118-123.
30. Rosen MJ, Jin J, McGee MF et al.: Laparoscopic component separation in the single-stage treatment of infected abdominal wall prosthetic removal. *Hernia* 2007; 11(5): 435-440.

received/otrzymano: 14.09.2018
accepted/zaakceptowano: 05.10.2018