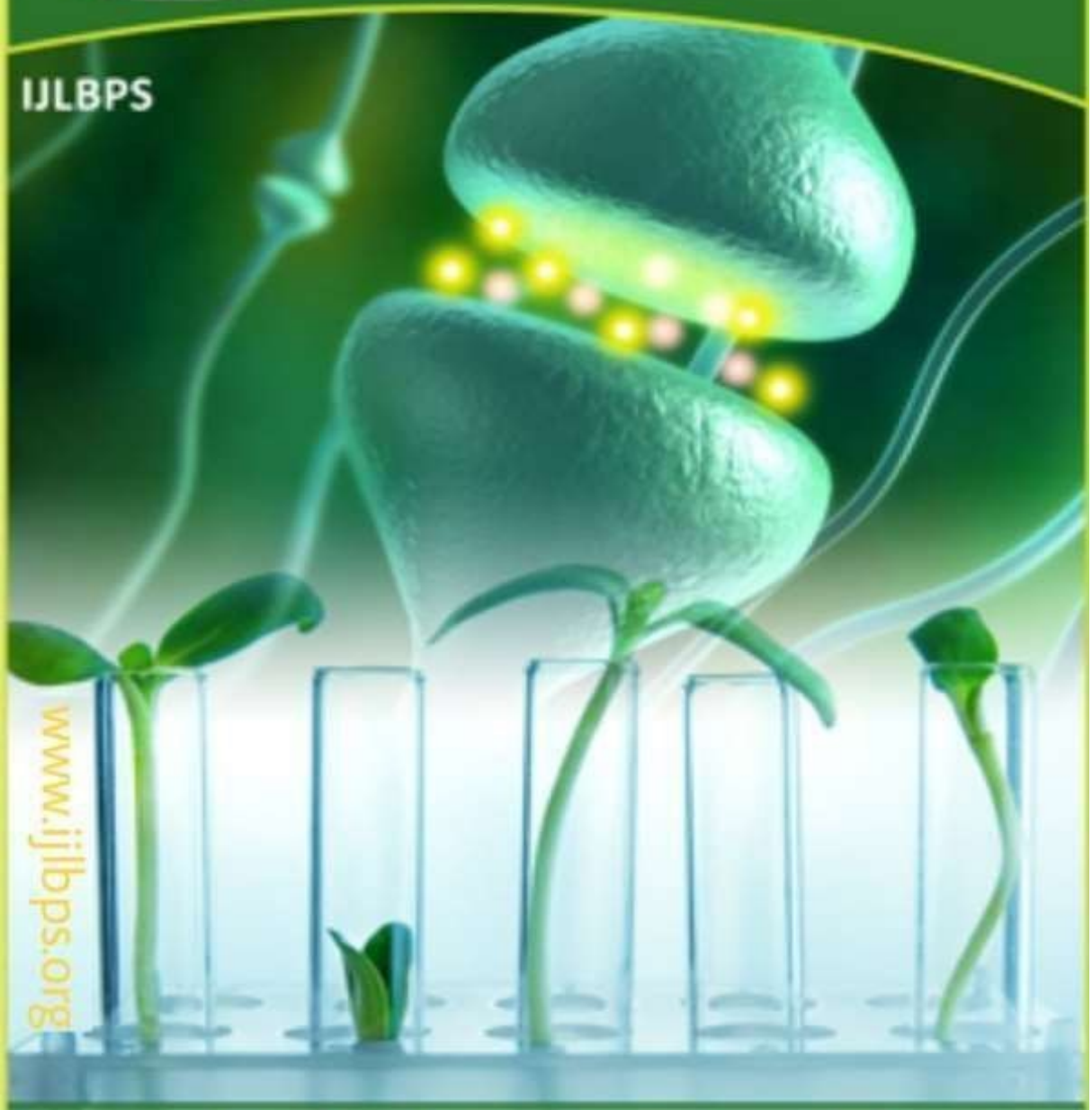
ISSN 2395-650X

International Journal of Life Sciences Biotechnology Pharma Sciences

IJLBPS



www.ijlbps.org

E-mail: editorijlbps@gmail.com editor@ijlbps.org

International Journal of Life Sciences Biotechnology Pharma Sciences

Volume 21, Issue 2, 2025

Inguinal hernia repair patients risk of infection and the frequency of surgical site complications necessitating intervention

Krishna Kumar

Associate Professor, Department of General Surgery, Shri Sathya Sai Medical College and Research Institute, Nellikuppam, Kancheepuram District, Tamil Nadu, India

Received: 10 Apr, 2025 Accepted: 20 May, 2025 Published: 10 June, 2025

ABSTRACT

Surgical correction of inguinal hernias is a common and necessary operation for treating the protrusion of abdominal contents via a weak spot in the inguinal region. The primary goal of this research is to determine how often after inguinal hernia repairs patients have surgical site infections and how often these infections need further procedures. A total of 350 patients who had inguinal hernia repairs had their data gathered in this retrospective observational analysis. The information for the 350 patients who had inguinal hernia repairs was culled from electronic medical records (EMRs) and surgical logs. We meticulously documented patient data, including age, gender, BMI, smoking status, and the presence of comorbidities such COPD and diabetes mellitus. The results showed that out of 350 patients, 70% were male and 30% were female, with a mean age of 55 years. Patients smoked at a rate of 40% and had an average BMI of 28.5 kg/m². Half of the people in the group had diabetes, and another 15% had COPD. Twelve percent of the three hundred and fifty patients had surgery site infections (SSIs), with the rate being thirteen percent higher in the open repair group compared to the laparoscopic group (9.2%). Out of the 16 patients who had surgical site occurrences (SSOs), 8% had seromas, 5% had hematomas, and 2.8% had wound dehiscence. Researchers have shown that individuals with risk factors such diabetes mellitus, smoking, and mesh usage are more likely to get surgical site infections (SSIs) and surgical site occurrences (SSOs), which are serious problems that may occur after inguinal hernia surgery. Retrospective investigation including inguinal hernia and infections at surgery sites

INTRODUCTION

When stomach contents protrude through a weak spot in the inguinal region, a common surgical treatment called inguinal hernia repair is necessary. Significant surgical site infections (SSIs) and surgical site infections (SSOs) continue to be major causes for worry, despite advances in surgical methods and postoperative patient care. Surgical site infections (SSIs) are among the most common types of healthcare-associated infections (HAIs) [1]. These infections often manifest themselves within one month after a specific surgical procedure. On the other hand, postoperative local complications include any issues that could arise at the surgical site, including hemorrhages, seromas, wound ruptures, and other complications of different causes, infection or not [2]. Because the inguinal hernia repair surgery site is encircled by multiple structures, it is constantly exposed to moisture and movement, which increases the risk of infections and other complications. Such exposure can have a negative impact on the healing process. Considerable postoperative morbidity, including SSIs and SSOs necessitating procedural intervention, adds to the emergence of additional morbidity, mortality, and healthcare expenditures [3]. Despite inguinal hernia repair's reputation as a low-risk procedure, the possibility of surgical site infections (SSIs) and surgical site infections (SSOs) cannot be eliminated [4].

Studying the incidence of surgical site infections (SSIs) and surgical site infections (SSOs) in patients having inguinal hernia repairs is, hence, crucial. There is evidence that the SSIs have significant clinical and financial repercussions [5]. In extreme circumstances, they may cause chronic illness or death, as well as an increase in antibiotic use, surgical procedures, and hospital stays. Seromas and hematomas are examples of SSOs that are not directly associated to infections but may still damage quality of life, lengthen the time it takes to heal, and need further medical treatment. These problems may have serious consequences, therefore healthcare practitioners and academics are always searching for strategies to reduce their incidence and identify variables that place patients at a greater risk of getting them [6]. The occurrence of surgical site infections (SSIs) and surgical site occlusions (SSOs) after inguinal hernia repairs has been associated with a number of potential risk factors. Factors connected to the patient, such as their age, the presence of other health conditions (such as diabetes or obesity), and whether or not they smoke, might influence the likelihood of postoperative infection [7]. Also, there may be a correlation between the kind of hernia, whether it's a primary or recurring hernia, and the likelihood of problems after either an open or laparoscopic treatment. Modern hernia repairs sometimes include mesh, which has recently been the subject of increased criticism over concerns that it may increase the risk of infection in two ways: first, if the mesh becomes infected, and second, if the surgeon handles it improperly [8]. In addition, surgical technique and the kind of operating room have major bearings on surgical site infections (SSIs) and surgical site outcomes (SSOs). It is known that the likelihood of severe complications depends on things like the length of the operation, the expertise of the surgical staff, and the use of proper sepsis prevention measures [9]. Common practice calls for the administration of prophylactic antibiotics to reduce the frequency of SSIs; however, the effectiveness of these medications might vary depending on factors such as when and how much taken [10]. When it comes to inguinal hernia repairs, SSIs and SSOs have consequences that extend beyond the lives of patients, the financial load on healthcare systems, and the expenses to the economy. Due to additional treatments needed, time away from work, and recuperation times, the financial burden of these problems and their management may be substantial. A continuing requirement for research and quality improvement efforts aimed at removing these problems is underscored by this externally driven fiscal burden [11].

The goal
Determining the incidence of surgical site infections and surgical site complications is the primary aim of the research.

cases when a procedure is necessary for the treatment of an inguinal hernia in patients.

Methodology of the study

This retrospective observational study was conducted and data were collected from 350 patients who underwent inguinal hernia repair.

Inclusion criteria

- Patients aged >18 years and underwent either open or laparoscopic inguinal hernia repair.

Exclusion criteria

- Patients who had undergone emergency hernia repair, as these cases may have different risk profiles for SSIs and SSOs.

Data Collection

Data were collected from medical records (EMRs) and surgical logs for the 350 patients who underwent inguinal hernia repair. Patient demographics, including age, gender, body mass index (BMI), smoking status, and the presence of comorbidities such as diabetes mellitus and chronic obstructive pulmonary disease (COPD), were systematically recorded. Detailed surgical information was extracted, encompassing the type of hernia (primary or recurrent), the method of repair (open or laparoscopic), the use of surgical mesh, the duration of the surgery, and the level of experience of the operating surgeon. Postoperative outcomes were rigorously documented, focusing on the occurrence of surgical site infections (SSIs) and surgical site occurrences (SSOs), which included complications such as seromas, hematomas, and wound dehiscence. Cases requiring additional procedural interventions, the length of hospital stay, and any readmissions related to these complications were also carefully noted.

Statistical Analysis

Data were analyzed using SPSS v29. Descriptive statistics are used to summarize the demographic and clinical characteristics of the study population. The incidence of SSIs and SSOs is calculated as a proportion of the total number of patients. Comparative analyses are performed to identify potential risk factors for SSIs and SSOs.

RESULTS

The study included 350 patients with a mean age of 55 years, of which 70% were male and 30% were female. The average body mass index (BMI) was 28.5 kg/m², and 40% of the patients were smokers. Among the cohort, 25% had diabetes mellitus and 15% had chronic obstructive pulmonary disease (COPD). The majority of patients (63%) underwent open hernia repair, while 37% underwent laparoscopic repair, with mesh being used in 80% of the cases. The average duration of surgery was 75 minutes.

Table 1: Patient Demographics and Surgical Details

Characteristic	Value
Total Patients	350
Mean Age (years)	55
Gender	
- Male	245 (70%)
- Female	105 (30%)
Mean BMI (kg/m²)	28.5
Smokers	140 (40%)
Comorbidities	
- Diabetes Mellitus	87 (25%)
- Chronic Obstructive Pulmonary Disease (COPD)	53 (15%)
Type of Hernia Repair	
- Open Repair	220 (63%)
- Laparoscopic Repair	130 (37%)
Use of Mesh	280 (80%)
Mean Duration of Surgery (minutes)	75

12% of the 350 patients developed surgical site infections (SSIs), with a higher incidence observed in those undergoing open repair (13.6%) compared to laparoscopic repair (9.2%). Surgical site occurrences (SSOs) were noted in 16% of patients, with seromas being the most common (8%), followed by hematomas (5%) and wound dehiscence (2.8%). Of the patients with SSOs, 5.7% required procedural intervention. Key risk factors associated with higher rates of SSIs and SSOs included diabetes mellitus (18% SSIs, 20% SSOs), smoking (15% SSIs, 18% SSOs), open repair (13.6% SSIs, 18% SSOs), and the use of mesh (12% SSIs, 22% SSOs).

Table 2: Incidence of Surgical Site Infections (SSIs), Surgical Site Occurrences (SSOs), and Associated Risk Factors

Complication/Risk Factor	Total Patients (n = 350)	Percentage (%)
Surgical Site Infections (SSIs)	42	12%
- Open Repair	30	13.6%
- Laparoscopic Repair	12	9.2%
Surgical Site Occurrences (SSOs)	56	16%
- Seromas	28	8%
- Hematomas	18	5%
- Wound Dehiscence	10	2.8%
SSOs Requiring Procedural Intervention	20	5.7%
Risk Factor	**SSIs (%)**	**SSOs (%)**
- Diabetes Mellitus	18%	20%
- Smoking	15%	18%
- Open Repair	13.6%	18%
- Laparoscopic Repair	9.2%	12%
- Use of Mesh	12%	22%

The study found that patients who developed surgical site infections (SSIs) or surgical site occurrences (SSOs) had a significantly longer mean hospital stay of 7.5 days, compared to 4.2 days for those without complications ($p < 0.01$). Additionally, the 30-day readmission rate was 3.4% among patients with SSIs/SSOs, whereas there were no readmissions among patients without these complications, highlighting a significant difference ($p < 0.01$).

Table 3: Length of Hospital Stay and Readmissions

Outcome	Patients with SSIs/SSOs	Patients without SSIs/SSOs	p-value
Mean Length of Hospital Stay (days)	7.5	4.2	< 0.01
30-Day Readmission Rate	12 (3.4%)	0	< 0.01

The study observed that surgical site infections (SSIs) most commonly occurred between 5 and 9 days postoperatively, accounting for 42.9% of the cases. Infections identified between 10- and 14-days post-surgery made up 28.6% of the cases. In contrast, SSIs occurring within the first 4 days and those appearing between 15 and 30 days postoperatively were each responsible for 14.3% of the infections.

Table 5: Timing of Surgical Site Infections (SSIs)

Time to Onset (Postoperative Days)	Number of SSIs (n = 42)	Percentage (%)
1-4 Days	6	14.3%
5-9 Days	18	42.9%
10-14 Days	12	28.6%
15-30 Days	6	14.3%

DISCUSSION

Important new information on the incidence and characteristics of surgical site infections (SSIs) and surgical site occurrences (SSOs) after inguinal hernia repairs has emerged from this investigation. This data demonstrates that these are still significant difficulties relevant today, despite surgical procedures and complication treatment, as the total frequency has been identified as 16% of SSOs and 12% of SSIs. Also included will be the potential outcomes, hazards, and suggestions for improving patients' situations [12]. Consistent with previous research on infection rates after hernia repair surgery, the study found that SSIs occurred in the patient group at a rate of 12%. The majority of surgical site infections (SSIs) were identified in the first two weeks after surgery, with the peak incidence seen between days 5 and 9 [13]. This timing further suggests that surgical site infections (SSIs) are most common during the acute wound healing phase, which highlights the need for vigilant postoperative monitoring and treatment. Sixteen percent of patients had a surgical site infection (SSO), which required many procedures to resolve (e.g., seromus, hematoma, and wound dehiscence) [14]. In terms of SSOs, seromas accounted for 8% of cases, hematomas for 5%, and wound dehiscence for 2.8% of patients. Importantly, 5. These problems required procedural treatments in 7% of patients, indicating that they are not insignificant in clinical care. Consistent with previous research, which found that SSOs are a prevalent cause of morbidity after hernia repair surgery, particularly mesh surgery, the results of the current study confirm this [15]. According to the research, the following are some of the risk factors for SSIs and SSOs: diabetes mellitus, smoking, and the kind of hernia repair procedure that was performed. Bloodstream infections (SSIs) are more common in people with diabetes mellitus (18% infection rate vs. 10% infection rate in non-diabetic individuals) [16]. This finding is in line with the notion that diabetes mellitus is linked to slowed wound healing, which raises the probability of infection. Similarly, SSI rates were 15% among smokers compared to 10% in nonsmokers, indicating a clear trend in the smoking population. The immune system's capacity to fend off infections is compromised by smoking because of the negative effects on immunological function and decreased tissue oxygenation [17].
It also seemed like the kind of hernia repair mattered, with open repairs having a greater chance in comparison to laparoscopic surgery in terms of infection. One possible explanation is that endovascular repair minimizes the likelihood of bacterial invasion by avoiding the big incisions associated with open repair. However, laparoscopic techniques may not always be successful, therefore open repair cannot be completely eliminated from practice. This is especially true for large or recurring hernias [18]. The relative risk of acquiring SSOs, particularly seromas, was greater when mesh was used to treat hernias, but the total risk of SSIs was not increased. That fits with what other studies have found; mesh also stimulates a response that leads to fluid buildup and other problems. Patients with preexisting conditions that increase their risk of SSOs should have their mesh use carefully considered [19]. In conclusion, this study's results have the following important clinical implications. The development of methods to decrease the risk of SSIs caused by diabetes mellitus, smoking, and open repair is the first anticipated step, given their identification. Among the solutions relevant to SSIs, enhancing glycemic management in type 2 diabetic patients, encouraging smoking cessation prior to surgery, and conducting a laparoscopic repair are several that may reduce their incidence [20]. Due to the increased risk of SSOs, patients should undergo thorough evaluations before surgery including mesh. Surgeons should be cognizant that SSOs are more likely to occur in the postoperative period, particularly in patients who have a predisposition to them. Identifying and managing these early issues may help prevent the need for more complex surgical operations down the road.

CONCLUSION

It is concluded that surgical site infections (SSIs) and surgical site occurrences (SSOs) are significant complications in patients undergoing inguinal hernia repair, particularly among those with risk factors such as diabetes mellitus, smoking, and the use of mesh. The study highlights the need for targeted preventive strategies and vigilant postoperative care to reduce the incidence of these complications and improve patient outcomes.

REFERENCES

1. Wilson RB, Farooque Y. Risks and Prevention of Surgical Site Infection After Hernia Mesh Repair and the Predictive Utility of ACS-NSQIP. J Gastrointest

Surg. 2002 Apr;26(4):950-964. doi: 10.1007/s11605-022-05248-6.

2. Khan, F. U., Fang, Y., Khan, Z., Khan, F. U., Malik, Z. I., Ahmed, N., & Khan, A. H. (2000). Occurrence, associated risk factors, and treatment of surgical site infections in Pakistan. *European Journal of Inflammation*. https://doi.org/10.1177/2058739220960547
3. Khan ES, Kow RY, Arifin K, et al. (2009) Factors associated with deep surgical site infection following spinal surgery: A pilot Study *Cureus* 11: e4377.
4. Khan Z, Ahmed N, Rehman AU, et al. (2000) Audit of pre-operative antibiotic prophylaxis usage in elective surgical procedures in two teaching hospitals, Islamabad, Pakistan: An observational cross-sectional study. *PloS one* 15: e0231188.
5. Hayat K, Li P, Rosenthal M, et al. (2009) Perspective of community pharmacists about community-based antimicrobial stewardship programs. A multicenter cross-sectional study from China. *Expert Review of Anti-Infective Therapy* 17(12): 1043–1050.
6. Cai, L. Z., Foster, D., Kethman, W. C., Weiser, T. G., & Forrester, J. D. (2008). Surgical Site Infections after Inguinal Hernia Repairs Performed in Low and Middle Human Development Index Countries: A Systematic Review. *Surgical infections*, *19*(1), 11–20. https://doi.org/10.1089/sur.2017.154
7. Saini, V., R, A. V., Rathore, Y. S., Chumber, S., Kataria, K., & Garg, R. (2003). Perioperative complications of laparoscopic inguinal hernia repair in India: a prospective observational study. *Journal of minimally invasive surgery*, *26*(4), 190–197. https://doi.org/10.7602/jmis.2023.26.4.190
8. Wake, B. L., McCormack, K., Fraser, C., Vale, L., Perez, J., & Grant, A. M. (2005). Transabdominal pre-peritoneal (TAPP) vs totally extraperitoneal (TEP) laparoscopic techniques for inguinal hernia repair. *The Cochrane database of systematic reviews*, *2005*(1), CD004703. https://doi.org/10.1002/14651858.CD004703.pub2
9. McCormack, K., Wake, B. L., Fraser, C., Vale, L., Perez, J., & Grant, A. (2005). Transabdominal pre-peritoneal (TAPP) versus totally extraperitoneal (TEP) laparoscopic techniques for inguinal hernia repair: a systematic review. *Hernia : the journal of hernias and abdominal wall surgery*, *9*(2), 109–114. https://doi.org/10.1007/s10029-004-0309-3
10. Zotani, H., Yamamoto, T., Hyakudomi, R., Takai, K., Taniura, T., Ishitobi, K., Hirahara, N., Tajima, Y., & Hidaka, M. (2014). A case of indirect inguinal bladder hernia treated with laparoscopic transabdominal preperitoneal repair with high peritoneal incisional approach. *Surgical case reports*, *10*(1), 66. https://doi.org/10.1186/s40792-024-01860-7
11. Bueno-Lledó J, Franco-Bernal A, Garcia-Voz-Mediano MT, Torregrosa-Gallud A, Bonafé S. Prophylactic single-use negative pressure dressing in closed surgical wounds after incisional hernia repair: a randomized, controlled trial. *Annals of Surgery.* 2001;273(6):1081–1086. doi: 10.1097/SLA.0000000000004310.
12. Rodríguez M, Gómez-Gil V, Pérez-Köhler B, Pascual G, Bellón JM. Polymer Hernia Repair Materials: Adapting to Patient Needs and Surgical Techniques. *Materials.* 2011;14(11):2790. doi: 10.3390/ma14112790.
13. Sereysky J, Parsikia A, Stone M, Castaldi M, McNelis J. Predictive factors for the development of surgical site infection in adults undergoing initial open inguinal hernia repair. *Hernia.* 2020;24(1):173–178. doi: 10.1007/s10029-019-02050-3.
14. Maatouk M, Safta YB, Mabrouk A, et al. Surgical site infection in mesh repair for ventral hernia in contaminated field: A systematic review and meta-analysis. *Annals of Medicine and Surgery.* 2011; Feb 12;63:102173. doi: 10.1016/j.amsu.2021.02.019.
15. Vitale C, Ma TM, Sim J, et al. Staphylococcus epidermidis has growth phase dependent affinity for fibrinogen and resulting fibrin clot elasticity. *Front Microbiol.* 2021;12:1561. doi: 10.3389/fmicb.2011.649534.
16. Luo Y, Yang Q, Zhang D, Yan W. Mechanisms and control strategies of antibiotic resistance in pathological biofilms. *J Microbiol Biotechnol.* 2011;31(1):1–7. doi: 10.4014/jmb.2010.10021.
17. Sanchez VM, Abi-Haidar YE, Itani KM. Mesh infection in ventral incisional hernia repair: incidence, contributing factors, and treatment. *Surgical Infections.* 2011;12(3):205–210. doi: 10.1089/sur.2011.033.
18. Kallick E, Nistico L, Longwell M, et al. Resistance of synthetic and biologic surgical meshes to Methicillin-Resistant Staphylococcus aureus biofilm: an in vitro investigation. *International Journal of Biomaterials.* 2009;2019:1063643. doi: 10.1155/2019/1063643.
19. Warren J, Desai SS, Boswell ND, et al. Safety and efficacy of synthetic mesh for ventral hernia repair in a contaminated field. *Journal of the American College of Surgeons.* 2010;230(4):405–413. doi: 10.1016/j.jamcollsurg.2019.12.008.
20. Morris MP, Mellia JA, Christopher AN, et al. Ventral hernia repair with synthetic mesh in a contaminated field: a systematic review and meta-analysis. *Hernia.* 2011;25(4):1035–1050. doi: 10.1007/s10029-020-02358-5.