International Journal of Nutrology
(Official Journal of the ABRAN - Brazilian Association of Nutrology)

REVIEW ARTICLE

DOI: 10.54448/ijn26212

Interventional radiology in the management of complications following bariatric surgery: a narrative review

Ankita Kumari[1], Maruf Ahmad[2*], Fauzia Khan[3], Mojahidul Islam[3], Abdul Wajid Bhat[4], Zahid Ahmad Wani[5], Kumar Aditya Ranjan Sahoo[2]

[1] Tribeni Sahai Mishra University. College of Paramedical, Amausi, Anora, Lucknow, Uttar Pradesh 226008, India.
[2] Centurion University of Technology and Management. Department of Radiology, School of Allied and Healthcare Sciences, Khurda Road, Bhubaneswar, Odisha, 752050, India.
[3] Integral University. Department of Allied and Healthcare Sciences, IIAHSR, Lucknow, Uttar Pradesh, 226026, India.
[4] Department of Medical Radiology and Imaging Technology, School of Allied and Healthcare Sciences, GNA University, Phagwara, Punjab, 144401, India.
[5] School of Science, Ajeenkya D Y Patil university, Pune, 412105, India.

*Corresponding author: Mr. Maruf Ahmad.
Centurion University of Technology and Management.
Department of Radiology, School of Allied and Healthcare Sciences, Khurda Road, Bhubaneswar, Odisha, 752050, India.
E-mail: marufpasha786@gmail.com
DOI: https://doi.org/10.54448/ijn26212
Received: 01-19-2026; Revised: 03-20-2026; Accepted: 03-25-2026; Published: 04-30-2026; IJN-id: 26212

Editor: Dr. Maria Cristina Jimenez Bazzano, MD, MsC.

Abstract

Introduction: With over 580,000 procedures carried out globally each year, bariatric surgery has emerged as one of the most successful long-term therapies for obesity, a global health issue that affects over 650 million adults worldwide. In addition to its morbidities, bariatric surgery, a proven treatment for morbid and other forms of obesity, has a number of early and late postoperative problems. Objective: This study aimed to assess the use of interventional radiology in the minimally invasive therapeutic management of problems, in addition to its uses in bariatric treatment. **Methods:** PubMed, Scopus, and Web of Science databases were utilized for conducting a narrative review. Peer-reviewed articles published in English between 2010 and 2025 have been studied primarily for techniques guided by IR for the treatment of problems post-bariatric surgery. **Results**: Interventional radiology helps immensely for the treatment of various common post-operative problems such as gastrointestinal leaks, strictures, abscesses, and bleeding. Various image-guided techniques such as percutaneous drainage, angiogram and embolization, balloon dilatation, and stenting have been proven to be successful and have reduced morbidity rates and lower hospital stay time for the patient as compared to certain individuals undergoing surgery. **Conclusion:** Interventional radiology is already a key component of modern postoperative therapy, with efficient, minimally invasive approaches to a variety of problems after bariatric surgery. A further step toward better patient outcomes would be the more extensive integration of interventions, standardized care pathways, and prospective study based on outcomes.

Keywords: Interventional Radiology; Bariatric Surgery; Postoperative Complications; Percutaneous Drainage; Embolization; Balloon Dilatation.

Introduction

The prevalence of obesity is rising quickly in both industrialized and developing nations, making it a significant global public health concern. This has resulted in a significant increase in the morbidity and healthcare burden associated with obesity on a global scale [1]. Bariatric surgery is currently a common and successful way to treat clinically severe obesity in addition to surgery. Due to unhealthy lifestyles, the prevalence of obesity has rapidly increased globally, resulting in a greater need for surgical techniques. Public health is thought to be seriously threatened by obesity [2].

Bariatric surgery, which encompasses gastric banding, sleeve gastrectomy, or RYGB, offers substantial and sustainable weight reduction, as well as possible normalization or marked reduction in comorbidities like type 2 diabetes mellitus, hypertension, or coronary disease [2]. However, bariatric surgery is not without risks. Gastrointestinal leaks, bleeding, anastomotic strictures, abscesses, and nutrient deficiencies are well-recognized complications that often affect patients during the recovery period and, in turn, have considerable effects on the success of surgery [3]. To ensure success in surgery and maintain the health and quality of life of patients, therefore, the complications ought to be controlled [4].

Reoperation is often necessary due to the conventional surgical management of such conditions, so the possibility of morbidity increases, and the recovery time prolongs [5,6]. However, in respect to such conditions, IR is identified and acknowledged as a revolutionary field that could potentially handle most of the conditions that develop after surgery with low-intervention and imageguided modalities. Fluid drainage, vascular embolization, stent placement, and balloon dilation are some of the low-intervention strategies that have been used successfully to treat conditions that developed due to surgery, and they resulted in less invasiveness and faster recovery periods [7].

Despite being an emerging field in the medical industry, there is still little coverage on interventional radiology in the mainstream medical literature on bariatric surgery. For several years now, the number of bariatric surgeries has continued to rise, and due to this, the need to have effective methods of treating conditions developed during surgery remains overlooked [4,8]. In many medical facilities, particularly within poverty-stricken or rural zones, there is a continued limitation with regard to access to specialized knowledge concerning IR. On top of this, there is an emerging need to emphasize IR's critical role within the management of complications related to bariatric procedures to support this continued disparity [9].

On top of this, there is an emerging need to emphasize IR's critical role within the management of complications related to bariatric procedures to support this continued disparity. The current study will extensively evaluate IR's critical role within the management of complications arising after bariatric procedures with a goal of filling this knowledge gap [4]. In doing so, this review highlights the necessity of integrating IR expertise within multidisciplinary bariatric teams and advocates for the establishment of standardized management protocols aimed at improving care quality and outcome consistency.

Review of Literature

A common therapeutic strategy for attaining long-term weight loss and reducing obesity-related comorbidities such type 2 diabetes mellitus, hypertension, and cardiovascular disease is bariatric surgery [4,10]. Surgical methods such as sleeve gastrectomy, adjustable gastric banding, and Roux-en-Y gastric bypass have shown good long-term results in properly chosen individuals [11]. Despite these advantages, there is a known risk of postoperative problems, which can arise both early and late after surgery [12].

Postoperative Complications Following Bariatric Surgery

Other gastrointestinal, vascular, infections, and metabolic conditions can generally be categorized into post-operative complications of bariatric surgery. Leaks, strictures, fistulae, and bowel obstructions have been among the most frequently observed gastrointestinal complications [3,13]. The occurrence of gastrointestinal leaks has been cited to range between 1% to 6%, with higher figures being observed among patients undergoing Roux-en-Y gastric bypass and sleeve gastrectomy procedures. Such leaks could potentially cause sepsis, peritonitis, and increased mortality rates if they are not immediately repaired [14,15].

Another common complication is anastomotic strictures, which often present with nausea, vomiting, dysphagia, or intolerance to oral intake. Reported incidence rates in the literature vary based on surgical technique and duration of follow-up, but range from 8% to 24% of patients [16]. Some strictures may be alleviated with conservative management, but many patients require intervention for symptomatology or persistent findings [17]. With incidence rates ranging from 0.8% to 2.1%, postoperative bleeding is a potentially life-threatening event. Bleeding may originate from staple lines, anastomotic sites, or vascular damage and often requires immediate clinical intervention [18]. Likewise, intra-abdominal infections and abscess formation have long remained significant sources of morbidity due to leaks or hematoma infection [18,19].

Patients who have had bariatric surgery are also at risk of deficiencies in several vitamins due to absorption changes in the altered anatomy of the digestive system. Iron, vitamin B12, calcium, and vitamin D deficiencies have also been observed in many cases, and failure of treatment can lead to anemia, osteoporosis, and neurological manifestations [20,21]. It also shows the importance of a multidisciplinary approach in treating these patients' post-surgery.

Role of Interventional Radiology in Complication Management

Interventional radiology has emerged as an important part of the minimally invasive management of bariatric surgery-related complications in the past 20 years [22]. In those patients who have severe comorbidities or are at a high risk of surgery, image-guided therapies have emerged as focused therapeutic options, which reduce the need for further surgery [23]. With their established technical and clinical successes, percutaneous image-guided drainage has long been recognized as the primary treatment option in localized fluid collections and postsurgical abscesses [24]. In a related manner, the role of angiographic embolization in the management of postoperative bleeding has shown its utility in achieving rapid hemostasis, thus obviating the morbidity related to re-operation [25].

Balloon dilatation and stent implantation have been performed with good outcomes in selected patients for luminal issues such as strictures and leaks [26]. These techniques enhance healing by restoring luminal patency and diverting intestinal contents, thereby preserving surgical anatomy.

Some refractory cases may still require surgical revision, however [27].

Limitations and Challenges

Despite the advantages offered by interventional radiology, there are also its drawbacks. While the incidence of complications is still quite modest, there have been cases of complications from the procedures that may relate to bleeding, infection, as well as damage to surrounding structures [28]. Moreover, for those patients who may be high-risk, the administration of contrast agents has been observed to increase the incidence of contrast-induced nephropathy; thus, careful patient selection is advised [29,30]. Access to interventional radiology procedures is also unpredictable, especially for those patients who have limited access to health care with adequate professionals and infrastructure [31,32]. Also, there is still a lack of long-term follow-up evidence for comparison between surgical reinterventions and procedures for interventional radiology [33].

Methods

Study Design

In order to synthesize and interpret the existing knowledge on the function of interventional radiology in the management of issues arising from bariatric surgeries, this article was developed using a narrative review model. In order to accommodate the synthesis of different study models such as original articles, systemic reviews, case series studies, and relevant studies in medicine, a narrative review model was applied.

Literature Search Strategy

A thorough search was carried out using three internet databases: Web of Science, PubMed, and Scopus. Peer-reviewed articles published between January 2010 and April 2024 that represent current bariatric surgery and interventional radiology procedures were taken into consideration. To guarantee clear and consistent reporting of the literature search, study selection, and synthesis process, this review was carried out in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 criteria [34].

The search terms using Medical Subject Headings (MeSH) and free-text terminology related to interventional radiology and bariatric surgery were included in the search strategy. The basic search terms include: *"bariatric surgery," "Roux-en-Y gastric bypass," "sleeve gastrectomy," "postoperative complications," "interventional radiology," "percutaneous drainage," "angiographic embolization," "balloon dilatation," "stent placement," and "gastrointestinal leak."* The search strategy was expanded and refined using Boolean searches if necessary. The list of articles selected was hand searched to look for other relevant articles.

Eligibility Criteria

Studies were considered eligible for inclusion on the basis of criteria like: Published in English, conducted on human adult populations, addressed complications following bariatric surgical procedures, included discussion of interventional radiology–guided diagnostic or therapeutic interventions, Article types included original research, systematic reviews, narrative reviews, case series, and clinically relevant case reports. Studies were excluded if they: were non-English publications, focused on animal models or in vitro research, did not involve bariatric surgical procedures, lacked relevance to interventional radiology-based management and were abstracts without accessible full text.

Study Selection and Data Synthesis

Titles and abstracts retrieved from the database search were screened for relevance. Full-text articles of potentially relevant studies were reviewed to determine final inclusion. Given the narrative nature of this review, no formal quality scoring or risk-of-bias assessment was applied. Data extracted from selected studies included: type of bariatric procedure performed, nature and timing of postoperative

complications, Interventional radiology techniques utilized, Reported technical and clinical outcomes and Procedure-related complications and limitations.

The included studies were synthesized thematically according to the type of postoperative complication- such as gastrointestinal leaks, strictures, hemorrhage, abscess formation, and metabolic complications—and the corresponding interventional radiology management strategies. Emphasis was placed on clinically relevant outcomes, technical feasibility, and the role of IR within multidisciplinary bariatric care.

Role of Interventional Radiology

With its ability to provide minimally invasive, image-guided procedures that could potentially substitute surgical re-intervention, interventional radiology is finding its increasing importance within therapy modalities for complication-related pathologies introduced by bariatric surgical procedures. Patients with obesity-related comorbid conditions, altered anatomy, or those with surgical risks would most benefit by this modality **[35,36]**, according to Table 1.

Management of Gastrointestinal Leaks and Fistulas

Among the most serious complications that can arise in the aftermath of bariatric surgery is the presence of gastrointestinal leakage, and this is especially true in the vicinity of the stables and anastomotic sites. The potential development of sepsis and prolonged morbidity can be prevented if there is timely and early management **[37,38]**. The most important role that can be considered in the management of this complication is that of image-guided percutaneous drainage of any fluid collection that is related to the case at hand. Other modalities, such as stent placement, can also be used in selected cases to steer the contents in the intestines and foster healing **[39]**.

Management of Anastomotic Strictures and Obstruction

Anastomotic strictures following bariatric surgery often present with dysphagia, vomiting, or intolerance to oral intake. In cases of fluoroscopic guidance, image-guided balloon dilatation has demonstrated outstanding clinical success and brilliant technical efficacy in the restorations of luminal patency **[40]**. Certain patients will require multiple treatments with dilatation and refractory cases may eventually undergo surgical revision. Thus, IR-guided therapies are one of the successful first-line or supplemental therapeutic methods **[41]**.

Management of Postoperative Hemorrhage

Although not a common complication, postoperative hemorrhage resulting from bariatric surgery is potentially life-threatening if not managed **[42]**. It is possible to accurately delineate the sources of bleeding, perhaps as a result of staple-line disruption and arterial injury, by angiographic analysis. The most effective and expeditious method, without the morbid implications of re-operation, is angiographic embolization for patients who either face a high degree of surgical risk or who were hemodynamically unstable **[43]**.

Management of Infections and Abscesses

Leaks or hematomas are very often the cause of intra-abdominal abscesses or infected fluid collections. With high success rates and minimal invasiveness, percutaneous catheter drainage, guided by CT or ultrasound, is considered to be the treatment of choice **[44,45]**. It is related to shorter hospital stay and reduced convalescence in comparison to drainage through surgery **[46]** (Table 1).

Limitations and Complications of IR Interventions

Despite the benefits of IR, there are also some demerits. Although the incidence of general complications is still, there are some reported procedure-specific issues such as bleeding, infection, and injury to surrounding structures **[47]**. In addition, there is also a risk of contrast-induced nephropathy when using iodinated contrast media, thus careful patient selection is warranted **[48]**. Diffusion of the procedure is also impeded by the absence of experience and facilities related to IR, especially in rural areas.

Table 1. Role of Interventional Radiology in the Management of Complications Following Bariatric Surgery.

Postoperative Complication	Interventional Radiology Technique	Clinical Indication	Reported Outcomes / Advantages	Key References
Gastrointestinal leaks and fistulas	Image-guided percutaneous drainage	Management of localized collections and abscesses secondary to staple-line or anastomotic leaks	High technical success, effective sepsis control, avoids urgent surgical reintervention	[9,14,36, 37,43,44]
Gastrointestinal leaks (selected cases)	Stent placement (endoscopic / image-guided)	Diversion of enteric contents to promote healing of leak sites	Facilitates leak closure, reduces need for reoperation in stable patients	[13,15,26, 27]

Anastomotic strictures	Balloon dilatation under fluoroscopic guidance	Symptomatic strictures causing dysphagia or obstruction	High clinical success, minimally invasive, repeatable procedure	[16,17,39]
Refractory strictures	Stent placement	Persistent or recurrent strictures after balloon dilatation	Temporary luminal patency, bridge to surgery if required	[15,16,26]
Postoperative hemorrhage	Selective angiographic embolization	Active arterial bleeding or staple-line hemorrhage	Rapid hemostasis, avoids open surgery, reduced morbidity	[18,19,25, 41,46]
Intraabdominal abscesses	Percutaneous catheter drainage (USG/CT-guided)	Postoperative abscess or infected fluid collection	First-line therapy, shorter hospital stays, low complication rate	[24,38,43, 44]
Infected hematomas	Image-guided drainage	Symptomatic or infected postoperative collections	Effective infection control, minimally invasive	[25,28,43]
IR procedurerelated risks	Contrast use, catheter manipulation	Risk of nephropathy, bleeding, adjacent organ injury	Generally low complication rates with proper patient selection	[28–31,47]
System-level limitation	Limited IR availability	Resource-limited or rural healthcare settings	Restricted access to minimally invasive care	[32,33,35]

Discussion

The management of postoperative issues that arise post-bariatric surgery has dramatically shifted with changes that came with the integration of IR interventions in postoperative care. Surgical interventions that are IR-guided are characterized by distinct advantages that make them desirable to traditional surgical interventions for postoperative issues. This is due to their minimally invasive nature and lower procedure-related mortality rates and hospital stays. This aspect is imperative for bariatric patients due to their elevated risk and comorbidity rates **[11,32-35]**. A surge of arising literature indicates that IR is a safe and effective alternative or adjunct to surgery for managing postoperative issues.

One among the most treacherous side effects of bariatric surgery is intestinal leakage resulting in fistulas, especially for sleeve gastrectomy and gastric bypass surgery. However, in order to prevent sepsis as well as long-term morbidity, early detection and immediate remedy are essential **[14,36,37]**. Image-guided percutaneous drainage operations have repeatedly demonstrated marked technical as well as clinical reliability in view of stabilizing patients or preventing surgery by means of dealing with localized collections, often avoiding an immediate surgical remedial measure **[24,43,44]**. Endoscopic or image-guided stent insertion enables diversion of intestinal contents as well as repair of leakage sites for a number of hemodynamically stable patients **[15,26,27]**.

Another frequent postoperative complication is anastomotic strictures, which generally present with vomiting, dysphagia, or intolerance to oral intake. Fluoroscopically guided balloon dilatation has shown to be very effective as a first-intervention technique due to good clinical response and the advantage of being reproducible and less invasive **[16,17,39]**. Temporary stent implantation may alleviate symptoms and serve, if necessary, as a bridge to definitive surgical therapy in cases of recurring or refractory strictures **[15,26]**.

Although infrequent, postoperative hemorrhage might prove to be life-threatening and thus has to be addressed appropriately and immediately. The exact determination of the exact site of hemorrhage, e.g., arterial damage or staple line, can be achieved by carrying out an angiography **[18,41]**. Especially in unstable or unstable high-risk patients, arterial embolization has been a successful method of managing postoperative hemorrhage, thereby restoring immediate hemostasis with minimal morbidity of reoperation **[25,42,46]**.

Leaks or bleeding can result in infected hematomas and intra-abdominal abscesses. Percutaneous catheter drainage under CT or ultrasound guidance has been deemed a preferred method over surgical drainage due to the high rate of success, reduced hospital stay, and quicker recovery rates **[24,38,43,45]**. These techniques have become absolutely essential in the majority of institutions as part of the postoperative care package.

Nevertheless, there are certain drawbacks to interventional radiology in spite of these beneficial features. There have been certain reports about procedure-related drawbacks, including bleeding and infective risk, and damage to structures—but the incidence is still considered low if proper technique and patient selection are used **[28,31]** Another worry, conferred by the use of contrast agents in the procedure, is the induction of nephropathy, particularly in compromised patients using iodinated contrast media **[29,30,47]**.

Another major issue is the disparity that exists with regard to access to interventional radiology services, as recognized across different healthcare infrastructures globally. The access that is restricted

with regard to less invasive IR-based therapies is due to inadequate infrastructural support, inadequate trained personnel, and inadequate access to special knowledge and training, particularly for rural populations **[32,33,35]**. The need for prospective trials and treatment regimens is also underscored by the fact that a great majority of the information that exists currently is based on retrospective work and professional experiences **[33,36]**.

The horizon for the utility of IR in the postoperative bariatric patient is constantly shifting with developing technologies in stent technologies, embolic agents, and image navigation systems **[22,23]**. Further assistance in accuracy and early detection of postoperative complications could be achieved with advanced robots and artificial intelligence technologies **[23]**. To further delineate the optimal place of interventional radiology in relation to surgical interventions, research emphasis in the future should be placed on prospective multicenter studies, cost-effectiveness, and outcome assessments.

Conclusion

Following bariatric surgical procedures, interventional radiology is slowly becoming a major component of the therapeutic management of post-surgical complications. Minimally invasive interventions such as stenting, balloon dilatation, angiographic embolization, and percutaneous draining are efficient therapeutic measures, which, when utilized on carefully selected patients, reduce morbidity. In addition, they reduce the length of stay in the hospital. Lack of well-standardized management procedures and inequalities in access to interventional radiology are still major obstacles that need to be overcome for the improvement of patient care. Moreover, to further advance the therapeutic outcomes of patient care, it is essential to conduct more research to develop effective postoperative management techniques.

CrediT

Author contributions: **Conceptualization**- All authors; **Data curation-** Ankita Kumari, Maruf Ahmad, Fauzia Khan; **Formal Analysis-** All authors; **Investigation-** All authors; **Methodology-** All authors; **Project administration-** Ankita Kumari, Maruf Ahmad; **Supervision:** Ankita Kumari, Maruf Ahmad; **Writing - original draft -** All authors; **Writing-review & editing-** All authors.

Acknowledgment

Not applicable.

Ethical Approval

As this study is a narrative review based exclusively on previously published literature, ethical approval and informed consent were not required.

Informed Consent

Not applicable.

Funding

Not applicable.

Data Sharing Statement

No additional data are available.

Conflict of Interest

The authors declare no conflict of interest.

Similarity Check

It was applied by Ithenticate®.

Application of Artificial Intelligence (AI)

Not applicable.

Peer Review Process

It was performed.

References

1. Ahmed SK, Mohammed RA. Obesity: prevalence, causes, consequences, management, preventive strategies and future research directions. Metabol Open. 2025;27:100375. doi:10.1016/j.metop.2025.100375
2. Ram Sohan P, Mahakalkar C, Kshirsagar S, et al. Long-term effectiveness and outcomes of bariatric surgery: a comprehensive review of current evidence and emerging trends. Cureus. 2024;16(8):e66500. doi:10.7759/cureus.66500
3. Burjonrappa S, Grover K. Bariatric surgery complications. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK615299
4. Gulinac M, Miteva DG, Peshevska-Sekulovska M, et al. Long-term effectiveness, outcomes and complications of bariatric surgery. World J Clin Cases. 2023;11(19):4504-12.

doi:10.12998/wjcc.v11.i19.4504

5. Figueroa-Giralt M, Torrealba A, Gonzalez T, Almeida P, Braghetto I, Csendes A. Risk factors for reoperation, morbidity, and mortality in patients with small bowel obstruction submitted to surgical treatment. Arq Bras Cir Dig. 2022;35:e1654. doi:10.1590/0102-672020210002e1654
6. Mao Z, Zhang J, Wang P, Zuo W. Association between duration of surgery and risks of mortality and unplanned reoperation modulated by surgical start time. Sci Rep. 2025;15(1):28057. doi:10.1038/s41598-025-12265-3
7. Leng S, Li W, Cai Y, Zhang Y. Endovascular treatment strategies of cerebrovascular injuries in traumatic brain injury. Chin J Traumatol. 2025;28(2):81-90. doi:10.1016/j.cjtee.2025.01.001
8. Aderinto N, Olatunji G, Kokori E, Olaniyi P, Isarinade T, Yusuf IA. Recent advances in bariatric surgery: a narrative review of weight loss procedures. Ann Med Surg (Lond). 2023;85(12):6091-104. doi:10.1097/MS9.0000000000001472
9. Shah S, Shah V, Ahmed AR, Blunt DM. Imaging in bariatric surgery: service set-up, post-operative anatomy and complications. Br J Radiol. 2011;84(998):101-11. doi:10.1259/bjr/18405029
10. Clinical evidence of low-calorie and ketogenic nutrological therapy before, during and after bariatric surgery: a systematic review | International Journal of Nutrology https://share.google/31qolLxPjJdHyi4p8.
11. Thaher O, Wollenhaupt F, Croner RS, Hukauf M, Stroh C. Effect of sleeve gastrectomy versus Roux-en-Y gastric bypass in morbid obesity: a multicenter comparative study. Langenbecks Arch Surg. 2024;409(1):156. doi:10.1007/s00423-024-03341-9
12. Lim R, Beekley A, Johnson DC, Davis KA. Early and late complications of bariatric operation. Trauma Surg Acute Care Open. 2018;3(1):e000219. doi:10.1136/tsaco-2018-000219
13. Hernández J, Boza C. Novel treatments for complications after bariatric surgery. Ann Surg Innov Res. 2016;10:3. doi:10.1186/s13022-015-0021-2
14. Mickevicius A, Sufi P, Heath D. Factors predicting gastrojejunal anastomosis leak following gastric bypass. Wideochir Inne Tech Maloinwazyjne. 2014;9(3):436-40. doi:10.5114/wiitm.2014.44142
15. Fanizza J, Lavalle S, Masiello E, et al. Endoscopic management of post-bariatric surgery complications: diagnostic work-up and innovative approaches. Diagnostics (Basel). 2026;16(3):431. doi:10.3390/diagnostics16030431
16. Dell'Anna G, Fanizza J, Mandarino FV, et al. Endoscopic management of anastomotic strictures after esophagogastric surgery. J Pers Med. 2025;15(3):111. doi:10.3390/jpm15030111
17. Abidi WM. Management of strictures in bariatric surgery. In: Thompson CC, editor. Bariatric Endoscopy. Cham: Springer; 2024. doi:10.1007/978-3-031-70004-0_16
18. Hébert J, Eltonsy S, Gaudet J, Jose C. Incidence and risk factors for anastomotic bleeding in lower gastrointestinal surgery. BMC Res Notes. 2019;12(1):378. doi:10.1186/s13104-019-4403-0
19. Adenuga AT. Acute severe lower gastrointestinal bleeding in low- and medium-income countries. Cureus. 2022;14(6):e26169. doi:10.7759/cureus.26169
20. Kamal FA, Fernet LY, Rodriguez M, et al. Nutritional deficiencies before and after bariatric surgery. Cureus. 2024;16(2):e55062. doi:10.7759/cureus.55062
21. Lupoli R, Lembo E, Saldalamacchia G, et al. Bariatric surgery and long-term nutritional issues. World J Diabetes. 2017;8(11):464-74. doi:10.4239/wjd.v8.i11.464
22. Wang Z, Zhu DQ, Zhu XY, et al. Interventional metabology: bariatric arterial embolization and denervation. J Diabetes. 2023;15(8):665-73. doi:10.1111/1753-0407.13437
23. Wah JNK. Rise of robotics and AI-assisted surgery. J Robot Surg. 2025;19(1):311. doi:10.1007/s11701-025-02485-0
24. Kuhelj D, Langel C. Image-guided percutaneous drainage of abdominal abscesses in pediatric patients. Children (Basel). 2024;11(3):290. doi:10.3390/children11030290
25. Sato Y, Matsueda K, Osawa M, et al. Interventional management for postoperative arterial bleeding. Int J Gastrointest Interv. 2022;11:179-85. doi:10.18528/ijgii220047
26. Moutzoukis M, Argyriou K, Kapsoritakis A, Christodoulou D. Endoscopic luminal stenting. World J Gastrointest Endosc. 2023;15(4):195-215. doi:10.4253/wjge.v15.i4.195
27. Protopapas AA, Kyritsi V, Tsavdaris D, et al. Endoscopic treatment of gastrointestinal

perforations and leaks. World J Gastrointest Endosc. 2026;18(1):114033. doi:10.4253/wjge.v18.i1.114033

28. Oseni AO, Chun JY, Morgan R, Ratnam L. Dealing with complications in interventional radiology. CVIR Endovasc. 2024;7(1):32. doi:10.1186/s42155-024-00442-w
29. Subahi A, Alhazmi N, Lardi M, et al. Contrast-induced nephropathy in low-risk cancer patients. Healthcare (Basel). 2026;14(1):115. doi:10.3390/healthcare14010115
30. Gupta RK, Bang TJ. Prevention of contrast-induced nephropathy. Semin Intervent Radiol. 2010;27(4):348-59. doi:10.1055/s-0030-1267860
31. Clements W, Koukounaras J. Complications in interventional radiology and quality improvement. CVIR Endovasc. 2023;6(1):38. doi:10.1186/s42155-023-00388-5
32. Morgan R, Haslam P, McCafferty I, et al. Provision of interventional radiology services 2023. Cardiovasc Intervent Radiol. 2024;47(1):3-25. doi:10.1007/s00270-023-03600-0
33. Campbell WA 4th, Chick JFB, Shin DS, Makary MS. Value of interventional radiology. Front Radiol. 2024;4:1403761. doi:10.3389/fradi.2024.1403761
34. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372:n71. doi:10.1136/bmj.n71
35. Taninokuchi Tomassoni M, Braccischi L, Russo M, et al. Image-guided minimally invasive spine treatments. Diagnostics (Basel). 2024;14(11):1147. doi:10.3390/diagnostics14111147
36. Mashoufi R, Mashoufi R. Interventional radiology for disease management. Cureus. 2023;15(11):e48603. doi:10.7759/cureus.48603
37. Jacobsen HJ, Nergard BJ, Leifsson BG, et al. Management of suspected anastomotic leak after gastric bypass. Br J Surg. 2014;101(4):417-23. doi:10.1002/bjs.9388
38. Alizadeh F, Li S, Inaba C, et al. Risk factors for gastrointestinal leak after bariatric surgery. J Am Coll Surg. 2018;227:10.1016/j.jamcollsurg.2018.03.030
39. Kuhelj D, Langel C. Image-guided percutaneous drainage of abdominal abscesses in pediatric patients. Children (Basel). 2024;11(3):290. doi:10.3390/children11030290
40. Espinel J, Pinedo E. Stenosis in gastric bypass: endoscopic management. World J Gastrointest Endosc. 2012;4(7):290-5. doi:10.4253/wjge.v4.i7.290
41. Zhou X, Zhang X, Jin X, et al. Surgical treatments for irreparable rotator cuff tears. Medicine (Baltimore). 2023;102(22):e33832. doi:10.1097/MD.0000000000033832
42. Kollmann L, Gruber M, Lock JF, et al. Management of major postoperative bleeding after bariatric surgery. Obes Surg. 2024;34(3):751-9. doi:10.1007/s11695-023-07040-0
43. Minici R, Mercurio M, Guzzardi G, et al. Transcatheter arterial embolization for pelvic trauma bleeding. Tomography. 2023;9(5):1660-82. doi:10.3390/tomography9050133
44. Abusedera M, Khalil M, Ali A, Hassan A. Percutaneous image-guided aspiration versus catheter drainage. Egypt J Radiol Nucl Med. 2013;44:223-30. doi:10.1016/j.ejrnm.2013.03.002
45. Harclerode TP, Gnugnoli DM. Percutaneous abscess drainage. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK564356
46. Loon MM, Mohamed EH, Oliveira Souza Lima SR, et al. Surgical drainage techniques and postoperative interventions. Cureus. 2024;16(11):e73364. doi:10.7759/cureus.73364
47. Hörer TM, Ierardi AM, Carriero S, et al. Emergent vessel embolization for hemorrhage. Semin Vasc Surg. 2023;36(2):283-99. doi:10.1053/j.semvascsurg.2023.04.011
48. Bhatt S, Rajpal N, Rathi V, Avasthi R. Contrast-induced nephropathy with intravenous iodinated contrast. Radiol Res Pract. 2016;2016:8792984. doi:10.1155/2016/8792984.