REVIEW ARTICLE

Post pancreatic surgery complications; surgeon vs interventional radiologists

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Abstract

Even at high-volume centres, pancreatic resections are linked with a high rate of complications, as well as significant morbidity and mortality. In the management of these occurrences, a multidisciplinary approach is required, and interventional radiology plays an important role in the treatment of patients who develop post-surgical problems. The current review was planned to provide an overview of interventional radiological techniques that can be used to treat various types of problems following pancreatic resection. Percutaneous fluid collection drainage, percutaneous transhepatic biliary operations, artery embolisation, venous interventions, and fistula embolisation are feasible therapeutic alternatives with fewer problems than a re-look surgery. They also have a shorter hospital stay and faster recovery.

Keywords: Embolization, interventional radiology (IR), pancreatic resection, postpancreatectomy hemorrhage, stent-graft.

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Introduction

Even in specialized high-volume centres, pancreatic surgery is associated with very high morbidity and death rates. Though some advances in surgical procedures and peri-operative service delivery have reduced fatalities in recent times, the occurrence of post-operative complications, including intra-abdominal collections and spillages, biliary problems, and vascular complications, continue to rise.[1] Furthermore, re-do surgeries are associated with a high fatality rate in the event of side effects. Yeo et al. showed increased mortality of 1.4% and morbidity of 41% in a study of 650 patients, with an average hospitalisation of 13 days.[2,3] They found that the lack of re-do surgery was an independent risk factor of overall enhanced survival in 26/650 patients (4%).[3]

Interventional radiology (IR) is a minimally invasive treatment option for post-surgical ailments. To cure post-surgical problems, different IR practices, such as transcutaneous irrigation, aspiration of collections or fluid pockets, percutaneous transhepatic biliary sewage, and vascular embolisation, have been approved for treatment.[4] IR procedures are a somewhat intrusive way of managing post-surgical problems than surgical re-intervention, and they may result in hospitalisation and lower re-do rates.[4] The current review was planned to provide an overview of IR techniques that can be used to treat various types of problems following pancreatic resection.

Percutaneous drainage: One of the most frequent issues following surgery of the pancreas is intra-abdominal fluid collections and abscesses. Once an intra-abdominal collection is recognised, transcutaneous irrigation can usually be performed under diagnostic imaging.[5] When the fluid collection is fully evident utilising ultrasound (US), a US-guided transcutaneous drain positioning is usually the best option because the US is commonly accessible, simple to use, and enables authentic surveillance of the insertion of the drain as well as having no radiation exposure.[6] Whenever the fluid collection is in-depth in the abdominal cavity and cannot be seen with the naked eye, computed tomography (CT) scan can provide a good anatomical picture to assist the secure positioning of transcutaneous drainage.[7] The cannula or Seldinger technique could be used to place drainage. The trocar method involves inserting a drainage cannula with a trocar needle straight into the compendium. The trocar technique allows for rapid drainage installation, which can be highly beneficial in seriously ill or enraged patients. The Seldinger technique entails several moves: the fluid collection is pierced with a single-shot needle, various calibre guidewires are placed, and the drain is processed up to the collection over the guidewire. The Seldinger technique is especially useful when there is only a tiny gap through which to attain the collection level, as is often the case when a retroperitoneal collection must be drained via an anterior route.[8] The major issue with this technique is that it could take much longer than the trocar method. Aspiration of a tiny quantity of stuff can determine the right position of the needle or drainage. In order to detect the presence of an inherent fistula, a tiny quantity of iodinated contrast may be infused via the cannula.[9] Transcutaneous drainage was required in 22.2% of cases after pancreaticoduodenectomy in a series of 373 subjects who had undergone pancreatic resection.

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The study documented a precise survival rate of 97.6% and overall success rate of 79.6%.[10]

Percutaneous transhepatic biliary procedures:
Endoscopic connection to the biliary system is not possible in patients undergoing Whipple's procedure with Roux-en-Y billion-enteric restoration. As a result, in the event of biliary problems, a transcutaneous transhepatic route is the only way to access the biliary system in such patients.[11] The biliary system is accessed by perforating an external bile duct with US and/or fluoroscopic supervision.

Transcutaneous biliary processes can be especially beneficial in cases of post-operative biliary leakages.[12] They have been revealed in approximately 3-4% cases following pancreatic surgery.[12]

These problems are frequently linked to others, most notably pancreatic fistulas and fluid collections.[13] Transcutaneous transhepatic bile outflow, which allows bile redirection from the location of the opening, is possible and successful in the overwhelming majority of cases in people who experience such complications following surgery.[13] The use of an occluded inflatable to restrict the biliary channel above the location of the hole, enabling for complete external drainage of the fluid, might be a helpful treatment option for post-operative bile leakage.[14] An alternative and more modern method is to employ a coated tube to seal the bile leakage and then extract it percutaneously. Gwon et al.[15] effectively utilised this technique in 11 patients with surgical bile leakage, with no relapse during the 1-year follow-up. Deformity of a biliary channel after bilio-pancreatic surgery can be a severe consequence.[15] Complications and death rates linked with operative re-intervention are as high as 28% and 2.6%, respectively. In the treatment of such complications, percutaneous therapies are an acceptable option. To resolve the obstruction, a bigger biliary drainage catheter can be placed and kept in place, and balloon dilatation can be done. Nevertheless, stenosis relapse may develop in up to 29-58% patients, necessitating repeated therapy sessions. Stents are seldom used to manage benign constraints since they must be retrieved after a certain length of time because the tube itself may induce an inflammatory response, scarring and stone development.[16] The use of disposable biliary stents, which may enhance long-term patent airway without requiring a future surgery for extraction, may be a unique alternative.[17]

Arterial embolism: Surgical intra-abdominal arterial bleeding remains among the most severe consequences, with a recorded frequency of 1.5-15% and a death rate of 20-50%.[16] Early haemorrhage occurs within 24 hours of surgery, and late haemorrhages happen after 24 hours. Early bleeding necessitates an urgent laparotomy since it is usually caused by a mechanical malfunction or underlying coagulopathy, but the best way to treat delayed bleeding is still debatable.[18] CT is critical in hemodynamically stable patients to handle the issue of a late haemorrhage and is particularly beneficial before angiography as it may avoid or direct it.[19] Rapid internal angiography has been proposed as the best approach for elucidating the location of bleeding in sick patients, with the benefit of saving time for following rapid intra-arterial therapy.[19]

Endoscopic artery embolisation is harmless and successful, with a claimed success rate of 50-100%, and is now being used to manage intra-abdominal haemorrhage.[20] Once the source of the haemorrhage has been located, a variety of procedures can be employed to[20] halt the haemorrhage and achieve haemodynamic stability. In the event of endpoint vascularisation, regional embolisation of the bleeding artery may be sufficient to establish haemostasis, but in the existence of collaterals, embolisation of both the input and outlet arteries is useful to prevent re-bleeding (isolation technique). Various components are now able to conduct vascular control, and they must be chosen based on the type of vascular occlusion required (transient or permanent).[21] Temporary embolisation, which is usually necessary after a severe haemorrhage, is achieved with resorbable substances, which enables the restoration of blood flow in a changeable window of time (inter alia: autologous blood clot, gelatine, or fibrin sponge). The real benefit of such materials is that they prevent the treated channel from being permanently occluded. Nevertheless, once the substance has been digested, a semi-danger of re-bleeding must be addressed.[21] Non-resorbable materials (polycyclic alcohol, acrylate, metallic coils, or detachable balloons) that produce persistent vascular blockage are used to achieve permanent embolisation. Because an optimal substance does not yet exist, the selection of suitable embolic stuff and skill for embolisation, which is critical to minimising failure and complications, necessitates the existence of an IR team with vast experience and the accessibility of an array of substances. Stent grafts of the artery just at the location of haemorrhage have been advocated as an option or in combination with embolisation, with the benefit of preserving end-organ patency and, therefore, reducing the risk of embolisation-related ischaemia.[21] The latest meta-analysis contrasting re-do surgery and transarterial embolisation for the treatment of delayed post-operative haemorrhage discovered a decrease in fatality (43% vs 20%) and complication (77% vs 35%) in the IR group, but the data was not statistically significant. The researchers determined that the overall treatment approach for late

haemorrhage will eventually be determined by the patient's clinical condition and the organisation's choice.[22]

Venous interventions: Post-operative problems may include the portal and mesenteric veins, which may establish constriction or thromboembolism following surgical therapy in some situations.[23] Furthermore, with the significant developments of polytetrafluoroethylene graft vascular restoration, this incidence may become more important in the coming time. Percutaneous endovascular therapy, like transjugular portosystemic shunt, direct and indirect thrombolysis, stenting and mechanical thrombolysis, which has been described primarily in liver transplant patients, may be a useful investment in the planning of these conditions following pancreatic surgery. Accessibility to the portal circulation can be gained by a transhepatic route, with straight imaging-guided rupture of a peripheral portal branch, or via a transjugular approach, with the portal network punctured from the hepatic veins.[24,25] Transhepatic access is typically less difficult than transjugular access and is the preferred approach in patients with normal clotting markers. In patients with a portal or mesenteric vein thrombus who have undergone anticoagulant therapy, the transjugular technique is the best option to reduce the risk of intraperitoneal haemorrhage associated with direct liver piercing.[26] Once entry to the portal circulation is obtained, pump dilatation and stenting of post-surgical constrictions can be performed utilising a variety of commercially available tools. Direct trombone-aspiration using a catheter or injection of thrombolytic drugs has been described as a possible and successful therapy for thrombus.[27]

Fistulas: Following the existence of fluid pockets, fistulas are by far the most prevalent consequence after pancreatic resection. Pancreatic fistulas are the most common, followed by intestinal and biliary tract fistulas.[28] This type of problem is usually linked with each other, most notably the existence of an abdominal fluid accumulation. Recent studies have shown that this type of problem may be cured without intervention in over 90% individuals. IR is essential in the non-surgical treatment of such problems.[29] In the setting of a fluid accumulation, percutaneous evacuation may be sufficient to manage the fluid and, in some circumstances, allow for voluntary healing of the fistula.[30] If the primary component of a fistula is biliary material, transhepatic insertion of a biliary drainage device, which diverts the bile away from the location of the fistula, may be sufficient to confirm fistula closure.[31] In situations of persistent biliary leak, the insertion of an occlusion balloon above the fistula is a successful technique by fully stopping the bile flow towards the location of the fistula.[31]

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Conclusion

IR is becoming increasingly important in the multidisciplinary management of problems following pancreatic surgery, enabling minimally invasive therapy even in critical patients, decreasing recovery periods, and minimising re-operation morbidity. Percutaneous drainage of fluid collections, percutaneous transhepatic biliary procedures, arterial embolisation, venous interventions and fistula embolisation are viable treatment options that have been reported as feasible, safe and effective techniques with fewer complications compared to re-look surgery, with a shorter hospital stay and faster recovery in the management of pancreatic disorders.

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