Case Report
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Percutaneous Removal of Foreign Bodies from the Bile Ducts

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ABSTRACT In minimally invasive treatment of obstructive jaundice, complications may occasionally occur: separation of a fragment of a conductor, drainage, balloon catheter, poor function of a plastic endoprosthesis. There are two possible methods for percutaneous removal of foreign bodies: extraction and pushing into the duodenum. Two observations of percutaneous removal of conductor fragments from the bile ducts are presented.

Keywords: obstructive jaundice, bile ducts, removal of foreign bodies, interventional radiology

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INTRODUCTION

The development of interventional radiology has led to the fact that many problems can be solved using minimally invasive, low-traumatic methods. Meanwhile, when using these methods, complications may occasionally occur. These problems can also be resolved minimally invasively, including by removing foreign bodies (fragments of conductors, catheters, drainages, non-functioning prostheses) percutaneously from the vessels, bile ducts, and genitourinary system [1–3]. We present two observations of the removal of conductor fragments from the bile ducts after percutaneous transhepatic drainage in obstructive jaundice.

Clinical observations

Case 1

Patient S., 50 years old, was admitted with complaints of fever up to 37.8ºC, weakness, yellowness of the skin and sclera. These phenomena last for 10 days. Infusion, detoxification, and antibacterial therapy were carried out. Dynamic cholescintigraphy revealed a serious disturbance in the absorption-excretory function of the liver, signs of intrahepatic cholescintigraphy with absence of bile flow into the intestines. Ultrasound examination revealed echo signs of intra- and extrahepatic biliary hypertension, enlarged congestive gallbladder, and dilation of the Wirsung duct. Increase in total bilirubin to 148 mmol/l due to the bound fraction. During duodenoscopy, a deformation was visualized in the antrum of the stomach along its lesser curvature and posterior wall, the mucous tuberosity with contact bleeding. In the duodenum in the upper third of the vertical branch there is pronounced infiltration of the mucosa, deformation and narrowing of the lumen, rigidity of the walls of the duodenum. Cancer of the head and body of the pancreas was suspected. External internal drainage of the liver was performed. In the ninth intercostal space along the mid-axillary line, the liver and then the bile ducts were punctured. The bile ducts are dilated, especially the common bile duct. A complete block of the common bile duct is noted. With some technical difficulties, recanalization of the tumor stricture zone began. A fragment of the conductor in the common bile duct was torn off. Using another guidewire, it was possible to recanalize the stricture, then an 8 Fr external-internal drainage was installed along the guidewire.

During subsequent fibrogastroduodenoscopy, it was noted that the lumen of the stomach is narrowed; a parietal tumor with ulcerations in the center is determined along the lesser curvature with a transition to the anterior and posterior walls. Ulcerations of irregular shape without clear edges, superficial in the body of the stomach, and deep in the antrum, 0.3 cm in depth and up to 2 cm in diameter. The boundaries of the tumor are from the subcardia to the prepyloric region. Mucosal infiltration was visually determined partially along the greater curvature and in the antrum. The ulceration in the antrum is covered with blood clots. The pylorus and duodenal bulb are without scar deformation, moderate compression of the intestine from the outside. The intestinal mucosa is swollen, possibly infiltrated in the area of the large duodenal papilla. A biopsy was taken. Histology: moderately differentiated adenocarcinoma. Conclusion: infiltrative- ulcerative cancer of the antrum and body of the stomach with signs of bleeding. Signs of impaired gastric emptying. Narrowing of the duodenal lumen to 1 cm in diameter due to external compression. Gradually, the patient's condition stabilized, total bilirubin was 23.0, bound 10.5, free 12.4 mmol/l.

Final diagnosis: stomach cancer (adenocarcinoma) T4N1M1 with invasion into the head and body of the pancreas, obstructive jaundice; existing gastrointestinal bleeding.

On the 13th day, during a control contrast study, a decrease in the degree of dilation of the bile ducts was noted. On the conductor, the drainage is removed. A catheter is inserted into the ducts, and through it a trap in the form of a loop (*Goose-Neck Snare*). A fragment of the guidewire is caught in the loop (Figure *A*), pulled into the catheter (Figure *B*) and removed. The external internal drainage is installed along the conductor in its previous position. The patient in satisfactory condition was transferred for treatment to an oncology hospital.

Case 2

Patient K., 69 years old, was admitted with complaints of heaviness in the right hypochondrium, general weakness, yellowness of the skin and sclera, discolored feces, dark urine. Considers himself sick for about 7 days. The department provided infusion, detoxification, and antibacterial therapy. Dynamic cholescintigraphy revealed a serious violation of the biliary function of the liver, signs of common bile duct block in the distal section, and a non-functioning gallbladder. Ultrasound shows echo evidence of intra- and extrahepatic biliary hypertension, enlarged congestive gallbladder, and chronic pancreatitis. Increase in total bilirubin to 96.4 μmol/l due to the bound fraction. Retrograde cholangiography revealed a narrowing of the distal part of the common bile duct, apparently caused by external compression. During duodenoscopy, there is no bile in the duodenum. At the mouth of the large duodenal papilla there is papillary growth with contact bleeding. External internal drainage of the liver was performed. With cholangiography: the bile ducts are dilated, especially the common bile duct, complete block of the common bile duct. When passing the conductor from the peripheral parts of the biliary tree into the common bile duct, due to the non-optimal acute angle of the puncture needle and the duct, various technical methods for advancing the instrument were used, and a fragment of the conductor was torn off. Another guide was successfully inserted into the duodenum. An 8 Fr drain is installed along the conductor.

X-ray examination shows a slight slowdown in the evacuation of barium suspension from the stomach, possibly due to inflammatory changes in the head of the pancreas. On the 19th day after primary drainage, a control contrast study was performed. The drainage has not moved and is functioning. On the guidewire, the drainage is removed, a catheter is inserted into the ducts, and a loop trap is inserted through it. A loop is thrown over the torn fragment of the conductor and then the trap with the captured conductor is removed. A 12 Fr drain is installed along the conductor. Total bilirubin 67.7, bound 25.8, free 36.9 mmol/l. There is a decrease in the intensity of jaundice. With a discharge diagnosis of pancreatic head cancer (T4M0N0), obstructive jaundice, chronic calculous cholecystitis, the patient was transferred to an oncology hospital for further treatment.

DISCUSSION

The removal of foreign bodies from the bile ducts is possible endoscopically, and if the endoscopic approach is impossible, percutaneously transhepatic one may be performed. Foreign bodies are fragments of conductors used for drainage and recanalization of common bile duct stricture [3–5], non-functioning plastic endoprostheses [6–9], fragments of drainage catheters [10], balloon catheter used for endoscopic dilatation of the stricture [11].

To remove foreign bodies, the following are used: a trap in the form of a loop ("*goose-neck snare"*) [1, 3, 4, 10, 12], various forceps [2, 10], balloon catheters [6, 7, 10] , conductor+catheter complex [8].

There are two tactics for removing foreign bodies: percutaneous extraction - pulling the foreign body out through a catheter (*"pulling technique"*) and pushing (*"pushing technique"*), as well as percutaneous endoscopy with removal [13].

In the case of non-functioning, displaced plastic endoprostheses, most often installed endoscopically [6–9], they are also removed. The need for this arises in 4.9% of cases, endoscopic removal is the first method, transhepatic removal is required in 0.5% of cases [7].

KT Brown et al. [8] pushed plastic endoprostheses into the intestine in 34 patients: first, a guidewire was passed through the endoprosthesis, and then pushed into the duodenum with a catheter on the guidewire. 35 endoprostheses (92%) out of 36 were thus successfully displaced into the intestine without complications. *D. Lagana et al.* [9] 8 patients had their endoprostheses removed by pushing them into the duodenum after being captured by a *Goose-Neck Snare*. In the second stage, metal stents were installed in 6 patients, and 4 plastic endoprostheses were installed in 2 patients.

According to V.G. Ivshin et al. [5] the separation of the conductor in the bile ducts is not a serious complication. The reasons for the detachment of the conductor are the following: puncture and catheterization of the duct at an acute angle, not the most optimal for subsequent manipulations, the occurrence of difficulties during further insertion of the conductor and catheter into the common bile duct; difficulties and lengthy attempts to recanalize a tumor stricture, including recanalization with a loop conductor.

R.G. Avanesyan et al. [14] from 2006 to 2018 performed percutaneous endobiliary interventions in 2,458 patients, of which 1319 (69.6%) had malignant diseases. The authors also noted the separation and fragmentation of the instruments used. Considering that the median survival rate of patients with malignant neoplasms does not exceed several months, fragments of guidewires and catheters were rarely removed from the ducts [14]. In benign diseases, foreign bodies from the ducts were removed endoscopically antegrade through the dilated transhepatic canal and introducer. In 3 patients, fragments of the conductors were removed, in 2, the distal segment of the catheter was removed, and in 1, the broken part of the external drainage was removed. The foreign body can be removed 2–3 weeks after drainage.

When should a loose conductor fragment be removed? At the first stage of percutaneous transhepatic drainage, the main task is to resolve obstructive jaundice and remove the patient from the state of liver failure. The detached fragment of the conductor does not interfere with this and does not pose a danger. Typically, conductor separation occurs after prolonged manipulation and various attempts. There is no need to increase the manipulation time. In addition, a channel has not formed around the catheter and drainage, and continued intervention may lead to leakage of bile and bleeding. Therefore, after some time, after the formation of a channel around the drainage, the removal of a foreign body can be carried out more quickly and without complications or burden on the patient. In the presented observations, removal using a trap loop was carried out without complications on the 13th and 19th days after drainage.

Should detached parts of instruments be removed in patients with malignant tumors? The patient's "survival" time is not determined and, with a successful operation, can be quite long. Therefore, in our opinion, removal should be carried out whenever possible.

How to remove a torn fragment of a conductor, endoscopically or percutaneously? It is easier to remove this foreign body with control cholangiography and replacement of drainage, since external-internal drainage in patients was performed because initially the endoscopic way of resolving jaundice was impossible.

CONCLUSION

Foreign bodies after minimally invasive treatment of obstructive jaundice (torn-off fragments of conductors, drains, balloon catheters, non-functioning plastic endoprostheses) can be removed transhepatically, both by pulling and by pushing into the duodenum, using various loops, traps, and forceps. Removal should not be forced; it should be performed after stabilizing the patient's condition, removing him from the state of liver failure, and forming a canal around the installed drainage.

REFERENCES

1. Cekirge S, Weiss JP, Foster RG, Neiman HL, McLean GK. Percutaneous retrieval of foreign bodies: experience with the nitinol Goose Neck snare. *J Vasc Interv Radiol* . 1993;4(6):805–810. https://doi.org/10.1016/s1051-0443(93)71978-8 PMID: 8281004
2. Selby JB, Tegtmeyer CJ, Bittner GM. Experience with new retrieval forceps for foreign body removal in the vascular, urinary, and biliary systems. *Radiology* . 1990;176(2):535–538. https://doi.org/10.1148/radiology.176.2.2367671 PMID: 2367671
3. Zurera LJ, Canis M , Espejo JJ, García-Revillo J, Delgado F, Benito A. Practical aspects in the percutaneous extraction of foreign bodies using a Goose-Neck Snare. *Radiologia* . 2007;49(4):247–254. PMID: 17594884 https://doi.org/10.1016/s0033-8338(07)73766-9
4. Khong PL, John PR. Percutaneous retrieval of a fractured biliary guidewire from a reduced liver graft. *Pediatr Radiol* . 1997;27(3):253–254. PMID: 9126584 https://doi.org/10.1007/s002470050115
5. Ivshin VG, Yakunin AYu, Lukichev OD. *Chreskozhnye diagnosticheskie i zhelcheotvodyashchie vmeshatel'stva u bol'nykh mekhanicheskoy zheltukhoy* . Tula; 2000. (In Russ).
6. Rossi UG, Rigamonti P, Cariati M. Malfunctioning plastic biliary endoprosthesis: percutaneous transhepatic balloon pulling technique. *Case Rep Radiol* . 2013;2013:596480. PMID: 23984158 https://doi.org/10.1155/2013/596480
7. Saad WE. Percutaneous transhepatic techniques for removal of endoscopically placed biliary plastic endoprostheses. *Tech Vasc Interv Radiol* . 2008;11(2):120–132. PMID: 18922457 https://doi.org/10.1053/j.tvir.2008.07.006
8. Brown KT, Schubert J, Covey AM, Brody LA, Sofocleous CT, Getrajdman GI. Displacement of endoscopically placed plastic biliary endoprostheses into the duodenum with a simple transhepatic technique. *J Vasc Interv Radiol* . 2004;15(10):1139–1143. PMID: 15466802 https://doi.org/10.1097/01.RVI.0000136292.23500.0A
9. Laganà D, Carrafiello G, Mangini M, Giorgianni A, Sturniolo G, Dionigi G, et al. An innovative percutaneous technique for the removal and replacement of dysfunctioning plastic biliary endoprostheses (PBE) in the management of malignant biliary occlusions. *Radiol Med*. 2007;112(2):264–271. PMID: 17361371 https://doi.org/10.1007/s11547-007-0140-x
10. Hsien-Tzu L, Hsiuo Shan T, Nai Chi C, Yi Yang L, Yi You C, Chien AnL. Percutaneous transhepatic techniques for retrieving fractured and intrahepatically dislodged percutaneous transhepatic biliary drainage catheters. *Diagn Interv Radiol.* 2017;23(6):461–464. PMID: 29097348 https://doi.org/10.5152/dir.2017.17064
11. Cotroneo AR, Di Stasi C, Marano G, Mutignani M, Costamagna G. The percutaneous retrieval of the fragment of a balloon catheter that ruptured in the biliary tract during endoscopic dilatation. *Radiol Med*. 1994;87(4):531–534. PMID: 8190946.
12. Hatzidakis AA , Karampekios S, Tsetis D, Gourtsoyiannis NC. Percutaneous foreign body retrieval through the biliary tract with the Nitinol Goose-Neck Snare. *Eur Radiol* . 2000;10(8):1355. https://doi.org/10.1007/s003309900285 PMID: 10939507
13. Khayat M, Khayat A, Chick JFB, Healey TL, Srinivasa RN. Percutaneous interventional radiology-operated endoscopy for foreign body removal. *Tech Vasc Interv Radiol.* 2019;22(3):149–153. PMID: 31623755 https://doi.org/10.1053/j.tvir.2019.04.007
14. Avanesyan RG, Korolev MP, Fedotov LE, Turyanchik MM, Sabri SN. Complications of endobiliary minimally invasive percutaneous procedures. *Annals of HPB Surgery.* 2019;24(2):88–99. (In Russ.) https://doi.org/10.16931/1995-5464.2019288-99 (In Russ).

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