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# Large Hepatic Artery Pseudoaneurysm Resection After Orthotopic Liver Transplantation

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Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
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**Conflict of interest:** None declared

**Patient:** Female, 41
**Final Diagnosis:** Hepatiic artery aneurysm
**Symptoms:** None
**Medication:** —
**Clinical Procedure:** —
**Specialty:** Surgery

**Objective:** Rare disease

**Background:** Hepatic artery (HA) pseudoaneurysm (PSA) after liver transplantation (OLTx) is rare but often fatal complication requiring quick repair. Its prevalence in patients after OLTx is around 0.94%.

**Case Report:** A 41-year-old female patient underwent a full-graft orthotopic liver transplantation (OLTx) for alcoholic liver cirrhosis in 2017. During regular postoperative Doppler ultrasonography (DU) check-ups, a large 3-cm pseudoaneurysm (PSA) was detected on the hepatic artery. The patient underwent a computed angiography (CTA) to verify the PSA anatomical localization and relationship with the transplanted liver graft. Selective celiac arteriography showed HA PSA and 90% stenosis of the hepatic artery after PSA. The stent graft placement was unsuccessful as the guiding wire was unable to pass through the post-PSA HA stenosis. The patient was scheduled for an open repair under general anesthesia. Through a right subcostal incision, the HA PSA was resected and the HA was mobilized and re-anastomosed using an end-to-end technique. Three months after the procedure, the patient has a good liver graft perfusion through the HA with no sign of PSA reoccurrence or stenosis.

**Conclusions:** Early detection of the HA PSA after OLTx is a life-threatening complication requiring prompt treatment. If endovascular treatment options fail, open surgical repair, despite its challenges, is the only possible treatment option.

**MeSH Keywords:** Aneurysm, False • Hepatic Artery • Liver Transplantation

**Full-text PDF:** https://www.amjcaserep.com/abstract/index/idArt/917728







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## Background

Orthotopic liver transplantation (OLTx) had become standard care for patients with end-stage liver failure [1]. The first successful OLTx was performed by Starzl et al. in 1967 [2]. Although the surgical technique has tremendously improved, a diverse range of complications still challenges surgeons and medical professionals, including biliary and vascular complications, acute and chronic rejection, and disease recurrence [3]. Vascular complications account for 6–10% of all post-OLTx complication. These complications include hepatic artery thrombosis or stenosis, hepatic artery (HA) pseudoaneurysm (PSA), and portal vein thrombosis or stenosis [4]. HA PSA is a rare but devastating complication requiring prompt treatment, with mortality reaching 69% and an incidence of 0.9–2.6% [5,6].

## Case Report

A 41-year-old female patient underwent a full-graft OLTx for alcoholic liver cirrhosis in September 2017. She was discharged after OLTx with good graft function and perfusion based on Doppler ultrasonography (DU) (AST: 0.27 µkat/l, ALT: 0.19 µkat/l, ALP: 0.72 µkat/l, GGT: 0.15 µkat/l). Immunosuppressive therapy was with *tacrolimus* and *mycophenolate mofetil*. During postoperative DU check-ups, a massive 3-cm pseudoaneurysm (PSA) was detected on the HA 1 year after OLTx. The patient underwent a computed angiography (CTA) to verify the PSA anatomical localization and the relationship with the transplanted liver graft (Figure 1). CTA revealed 90% stenosis of the hepatic artery (HA) after the PSA. Based on the CTA, the patient was scheduled for an elective stent graft placement into the HA PSA in order to avoid surgical intervention. A retrograde approach through the left axillary artery was chosen. Selective celiac arteriography showed a 3-cm HA PSA and 90% stenosis of the hepatic artery after PSA. The stent graft placement was unsuccessful, as the guide wire was unable to pass through the HA stenosis (Figure 2). The patient was then scheduled for an open repair.

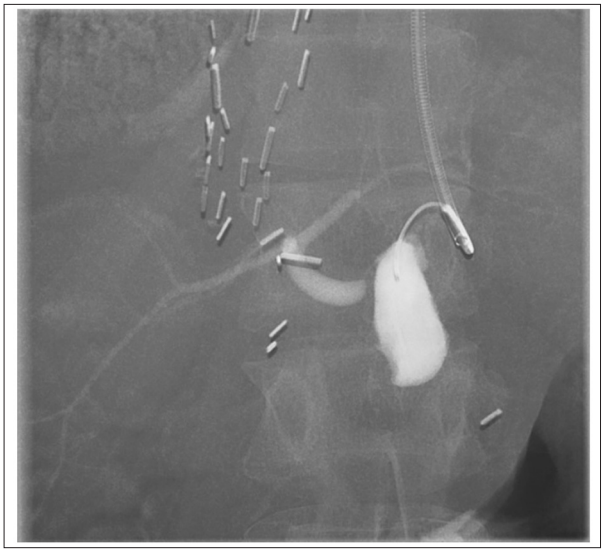

**Figure 2.** Angiography of the hepatic artery pseudoaneurysm with 90% stenosis.

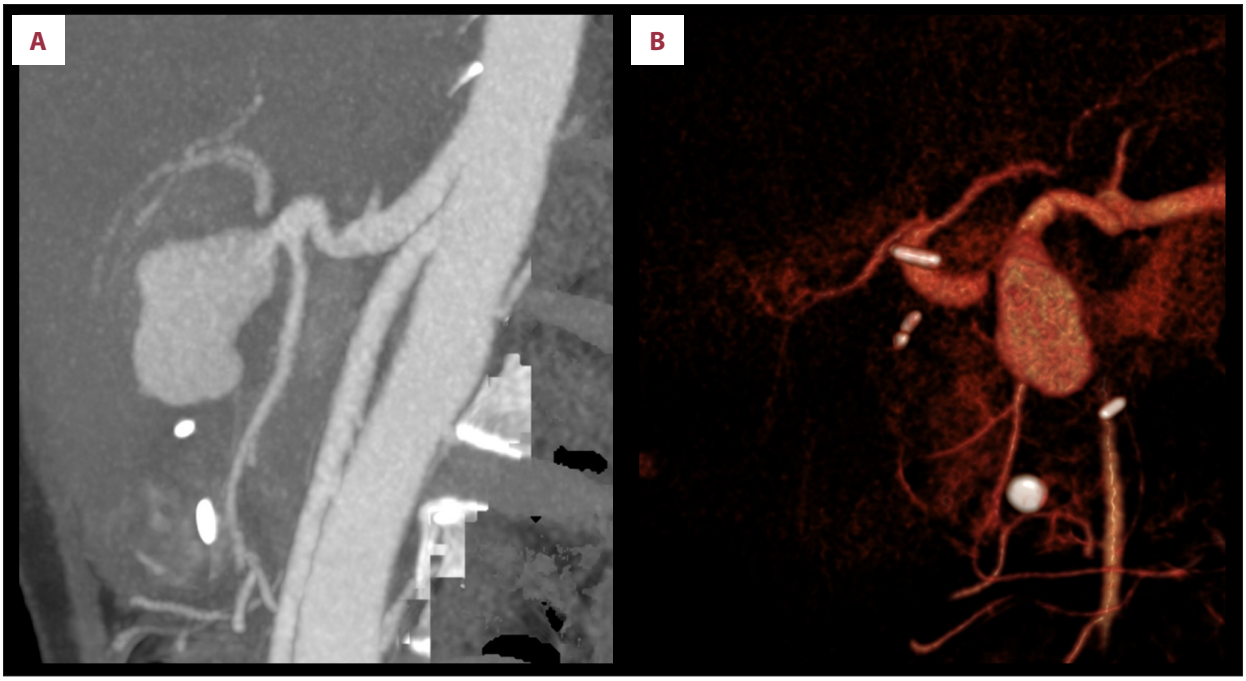


**Figure 1.** Computed angiography (CTA) of the hepatic artery pseudoaneurysm (PSA). (**A**) Hepatic artery 3×2 cm PSA reconstruction. (**B**) 90% stenosis on the hepatic artery after PSA (arrow).



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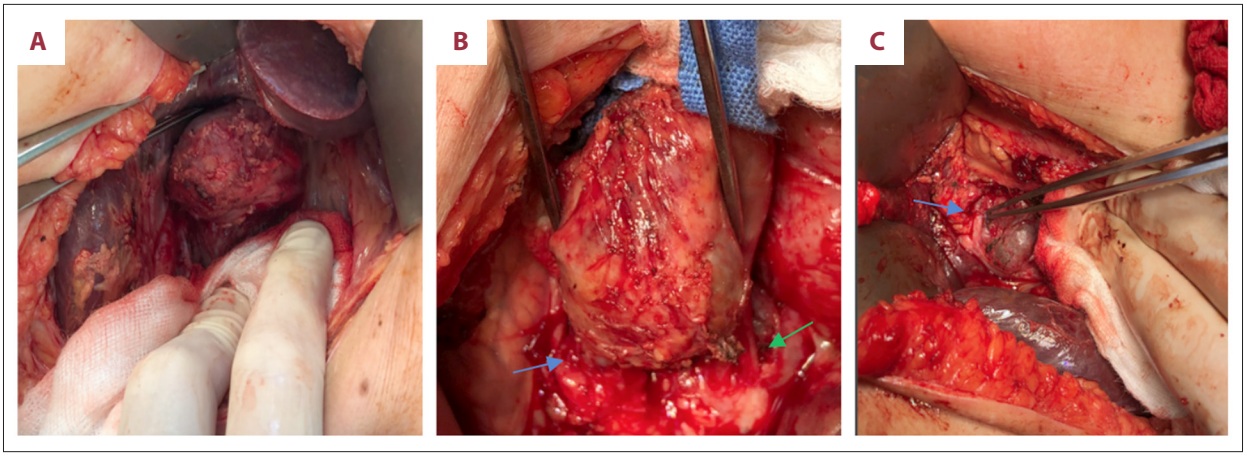


**Figure 3.** Dissected hepatic artery (HA) pseudoaneurysm (PSA). (**A**) Dissected HA PSA. (**B**) Patients HA (blue arrow) and liver grafts HA (green arrow). (**C**) End-to-end anastomosis of patient's and liver graft's HA (arrow).

Under general anesthesia and through a right subcostal incision, the HA PSA was carefully dissected (Figure 3A). HA above and below the PSA was mobilized (Figure 3B). The HA was cross-clamped above and below the PSA under partial heparinization (5000 units of heparin). The PSA was fully resected, and the HA was anastomosed to the HA of the liver graft using an end-to-end technique with Prolene 6/0 (Figure 3C).

The postoperative period was uneventful. DU after the procedure showed good liver graft perfusion. The patient was discharged on the 6$^{th}$ postoperative day with good liver graft perfusion and function (AST: 0.43 µkat/l, ALT: 0.18 µkat/l, ALP: 0.59 µkat/l, GGT: 0.28 µkat/l) with 100 mg acetylsalicylic acid (aspirin) daily dose and full immunosuppressive therapy. Follow-ups at 1 and 3 months after the procedure showed good graft perfusion on DU, with no sign of PSA on the HA.

## Discussion

HA PSA accounts for 0.94% of all vascular complications after OLTx. It is a very severe complication, with a mortality rate of up to 69% [5]. Vopin et al. analyzed 787 OLTx patients for common risk factors leading to HA PSA formation, reporting that reconstructions of bilio-enteric anastomosis and postoperative biliary leaks are the 2 most important factors increasing the risk of postoperative HA PSA formation [6]. A literature review by Harrison et al. summarized other major risk factors affecting the incidence of HA PSA formation; they performed the most extensive retrospective up-to-date analysis of known data regarding HA PSA using publications ranging from 1991 to 2014. Other significant risk factors affecting the incidence of HA PSA formation include the presence of infection, Roux-en-Y biliary anastomosis, OLTx for PBC, and primary sclerosing cholangitis [5,6]. However, a multi-centric database is ultimately necessary to produce control cohorts that could be used for a metanalysis and identification of major factors affecting HA PSA formation after OLTx.

HA PSA can be classified as either intrahepatic or extrahepatic based on its localization [7]. Most extrahepatic HA PSAs are spontaneous, predominantly occurring at the hepatic artery anastomosis [5–7]. Intrahepatic HA PSAs are primarily iatrogenic, caused by percutaneous transhepatic procedures [7].

The "early detection" HA PSA prior to its rupture significantly improves the survival rate, as ruptured HA PSA treatment is very difficult. Also, during "early detection" of the HA PSA, treatment modalities are much broader as various endovascular treatment options can be considered before surgical resection, including hepatic artery re-anastomoses [8]. Surgical reconstruction of the HA PSA is not always attainable in the field of infection or hemorrhage. Regrettably, in most cases with active bleeding, the HA has to be sacrificed in order to control the bleeding to save the patient, leading to a graft necrosis and the need for retransplantation [9].

## Conclusions

Postoperative follow-up in patients after OLTx plays an essential role in HA PSA "early detection". "Early detection" of HA PSA is crucial in maximizing patient survival and preserving the graft, while giving sufficient time for planning an ideal treatment modality.

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### Conflict of interest

None.



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