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Case report
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ENDOVASCULAR TREATMENT OF VISCERAL ARTERY ANEURYSMS − CASE REPORTS

ENDOVASKULARNI TRETMAN ANEURIZME VISCERALNIH ARTERIJA − PRIKAZ SLUČAJEVA

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Summary

Introduction. Visceral artery aneurysms, including those affecting the splenic and hepatic arteries, rank among the most common types of abnormalities within the visceral arterial system. Treatment options for visceral artery aneurysms include open surgery and endovascular repair, with the latter being preferred for anatomically suitable and asymptomatic patients. **Case Report.** We present two cases, where the first concerns a 72-year-old male patient with an asymptomatic large common hepatic artery aneurism measuring 4.5 cm in maximum diameter. Computed tomography angiography revealed a 1.1 cm enlargement of the aneurism maximum diameter over a two-year period. The second case involves a 65-year-old female patient with asymptomatic splenic artery aneurism measuring 3.2 cm in maximum diameter. Both patients underwent endovascular stent deployment as part of their treatment regimen. No complications were observed during the early and late post-procedural phases. Follow-up imaging via control computed tomography angiography one month after the procedure revealed transparent stents in both cases without evidence of endoleaks. **Conclusion.** Endovascular stent deployment emerges as a safe and most efficient treatment modality for asymptomatic visceral artery aneurysms

Key words: Endovascular Aneurysm Repair; Splenic Artery; Hepatic Artery; Aneurysm; Computed Tomography Angiography; Treatment Outcome

Sažetak

Uvod. Aneurizma lijenalne arterije i aneurizma hepatične arterije su najčešće aneurizme visceralnih arterija. Aneurizme visceralnih arterija mogu biti zbrinute otvoreno hirurški ili endovaskularno. Endovaskularni tretman je prvi izbor kod anatomski pogodnih i asimptomatskih pacijenata. **Prikaz slučaja.** Prikaz slučaja dva pacijenta. Prvi pacijent je 72 godine star muškarac sa asimptomatskom velikom aneurizmom zajedničke hepatične arterije sa maksimalnim prečnikom od 4,5 cm. Kompjuterizovana tomografska angiografija pokazala je uvećanje maksimalnog prečnika od 1,1 cm za dve godine. Drugi pacijent je 65 godina stara žena sa asimptomatskom aneurizmom lijenalne arterije maksimalnog prečnika 3,2 cm. Oba pacijenta su tretirana endovaskularnom *stent deployment* metodom. Rani i kasni postproceduralni tok je protekao uredno bez komplikacija. Kontrolna angiografija kompjuterizovanom tomografijom urađena je jedan mesec nakon procedure i u oba slučaja je prikazala stent koji je prohodan i bez endolika. **Zaključak.** Endovaskularno rešavanje aneurizmatske bolesti uz simultanu endovaskularnu restituciju arterijskog protoka u arteriji je bezbedna metoda i predstavlja najbolji način lečenja asimptomatskih aneurizmi visceralnih arterija.

Ključne reči: endovaskularni tretman aneurizme; lijenalna arterija; hepatična arterija; aneurizma; CT angiografija; ishod lečenja

Introduction

An aneurysm is a permanent, concentric or eccentric, segmental dilatation in the wall of an artery, measuring at least 1.5 times its normal diameter [1, 2]. Aneurysms affecting the visceral arteries are rare but clinically significant vascular condition. Splenic artery aneurysm (SAA) and hepatic artery aneurysm (HAA) are the most common types of visceral artery aneurysms [3, 4]. Rupture, the most severe complication, is associated with a high mortality rate [5, 6]. Computed tomography angiography (CTA) serves as the gold standard in diagnostics [5−7]. Treatment options for visceral artery aneurysms include open surgery and endovascular repair, with the latter being the preferred choice in anatomically suitable and asymptomatic patients.

The aim of this study is to present two cases of large HAA and SAA successfully treated using the endovascular stent deployment method.

Case Report

The first case involves a 72-year-old male who, two years prior, underwent a CT scan following an abdominal injury sustained in a traffic accident. This scan, conducted as part of emergency diagnostics, revealed HAA with a maximum diameter of 3.4 cm.

Two years later, the patient presented to a vascular surgeon. Despite being completely asymptomatic, he had a medical history significant for hypertension, long-term smoking, chronic gastritis, and a past COVID infection three years prior. A subsequent CTA revealed large aneurysm of the common hepatic ar-

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Abbreviations

SAA – Splenic artery aneurysm
HAA – Hepatic artery aneurysm
CTA – Computed tomography angiography
DUS – Duplex ultrasound

Figure 1. CTA revealing enlargement of the hepatic artery aneurysm, abdominal aortic aneurysm and aneurysm of right common iliac artery
Slika 1. *Kompjuterizovana tomografska angiografija na kojoj je opisano uvećanje aneurizme hepatične arterije, aneurizma abdominalne aorte i aneurizma desne zajedničke ilijačne arterije*

tery, with maximum diameter of 4.5 cm, an abdominal aortic aneurysm measuring 4 cm in diameter, and an aneurysm of right common iliac artery with maximum diameter of 2.3 cm **(Figure 1).** CTA indicated an increase in the maximum diameter of the HAA by 1.1 cm over the course of two years.

Considering the patient's completely asymptomatic status alongside the significant enlargement of the large HAA, we opted for an endovascular stent deployment procedure, in accordance with the established guidelines.

The procedure was performed in the angiography room in the Radiology Center of the University Clinical Center of Vojvodina, with collaboration from a vascular surgeon, interventional radiologist, and anesthesiologist. Brachial artery puncture was conducted under ultrasound guidance. A non-selective angiography of the abdominal aorta was initially performed, followed by a selective angiography of the celiac trunk. Confirmation of a large aneurysm of the common hepatic artery was obtained, and a Jotec 5x38 mm stent graft was subsequently placed. Control angiography revealed normal findings, without evidence of endoleaks or residual filling of the aneurysm, and preserved flow of the branches **(Figure 2).** The procedure

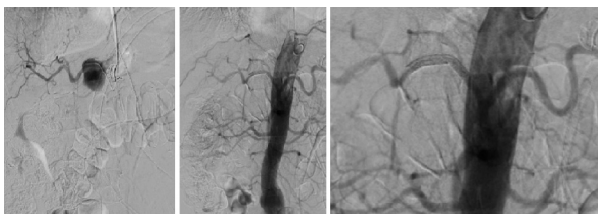

Figure 2. Selective angiography of the celiac trunk, and stent deployment in the common hepatic artery aneurism. Follow-up angiography without evidence of endoleaks
Slika 2. *Selektivna angiografija celijačnog trunkusa i postavljanje stenta u aneurizmu zajedničke hepatične arterije. Kontrolna angiografija bez endolika*

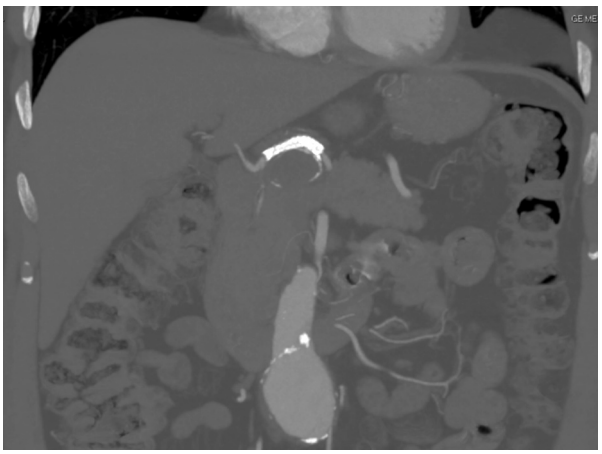

Figure 3. Follow-up CTA after endovascular treatment of the hepatic artery aneurysm, without evidence of endoleaks
Slika 3. *Kontrolna kompjuterizovana tomografska angiografija nakon endovaskularnog tretmana aneurizme hepatične arterije, bez endolika*

transpired without complications, with the administration of 5000 IU of Heparin during the intervention.

The post-procedural recovery progressed smoothly, and the patient was discharged the following day for home care, with a prescription of dual antiplatelet therapy. In the early stage, on the third day post-endovascular procedure, a small hematoma developed in the site of the brachial artery puncture, which was effectively managed through conservative measures.

One month post-procedure, a follow-up CTA was conducted, revealing patent stent without evidence of endoleaks and preserved flow in the branches, indicative of normal findings **(Figure 3).**

The second case involves a 65-year-old female patient diagnosed with an aneurysm of the splenic artery, as identified on CTA. The maximum diameter of the aneurysm measured 3.2 cm, lacking clear demarcation of the neck and thrombotic masses, with a partially calcified wall **(Figure 4).** The patient remained asymptomatic but presented with hypertension, cardiomyopathy, hypothyreoidism, hepatic steatosis, and psoriasis.

Given the patient's asymptomatic status and the presence of a large SAA, a decision was made to proceed with an endovascular stent deployment procedure.

The procedure was performed similarly to the previous one, with a brachial artery puncture guided by

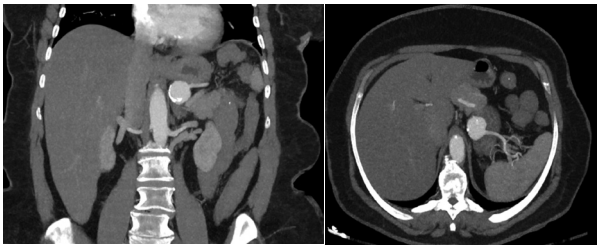

Figure 4. CTA revealing splenic artery aneurysm
Slika 4. *Kompjuterizovana tomografska angiografija na kojoj je prikazana aneurizma lijenalne arterije*

Figure 5. Selective angiography of the splenic artery and celiac trunk, and stent deployment in the splenic artery aneurism. Follow-up angiography without evidence of endoleaks
Slika 5. *Selektivna angiografija lijenalne arterije i celijačnog trunkusa i postavljanje stenta u aneurizmu lijenalne arterije. Kontrolna angiografija bez endolika*

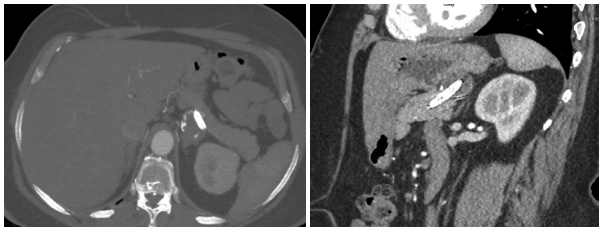

Figure 6. Follow-up CTA without endoleaks
Slika 6. *Kontrolna kompjuterizovana tomografska angiografija bez endolika*

ultrasound. Initially, a non-selective angiography of the abdominal aorta was performed, followed by a selective angiography of the celiac trunk. Subsequently, a large splenic artery aneurism was confirmed, and a Jotec 5x37 mm stent graft was deployed. Control angiography revealed normal findings without evidence of endoleaks or residual aneurism filling **(Figure 5).** During the procedure, 4000 IU of Heparin was administered.

The patient's early and late post-procedural course progressed without complications, and the patient was discharged the next day for home case, with dual antiplatelet therapy prescribed. A follow-up CTA performed one month later indicated a transparent stent without evidence of endoleaks **(Figure 6).**

Discussion

Visceral artery aneurysms are rare, but the complications are often life-threatening [4, 8]. The precise etiology of HAA and SAA remains unclear, though atherosclerosis is commonly implicated, while hypertension is a frequent comorbidity as per literature. Additionally, liver cirrhosis, portal hypertension, female gender, and pregnancy are identified as major risk factors for visceral artery aneurysms [4].

Guidelines recommend repair for HAA exceeding 2 cm in diameter and SAA exceeding 3 cm in diameter, as well as for all symptomatic aneurysms, pregnant women, and instances where the aneurysm enlarges by over 0.5 cm per year [4, 9, 10]. However, some studies have not established a clear correlation between the aneurism diameter and the risk of rupture [11].

Rupture of a visceral artery aneurysm, the most severe complication, posed a life-threatening situation often presenting as hemorrhagic shock, necessitating urgent surgical intervention. HAA rupture can sometimes lead to biliary tract involvement, manifesting as Quincke's triad, which includes jaundice, biliary colic and gastrointestinal bleeding [12]. Most visceral aneurysms are diagnosed only after rupture occurs [13]. Treating ruptured HAA can be more challenging due to the complexity of maintaining hepatobiliary system perfusion [14].

With the development of sophisticated imaging modalities such as CTA, magnetic resonance angiography, and duplex ultrasound (DUS), the diagnosis of visceral artery aneurysms in asymptomatic stages has become more accessible, leading to improved treatment outcomes [4, 5]. While DUS is a safe diagnostic tool, it has its limitations. Its sensitivity in detecting SAA and HAA smaller than 3 cm is poor, and it may be hindered by bowel gas shadowing and obesity [4]. Therefore, we opted for CTA for precise measurement, assessment of aneurysm enlargement, consideration of endovascular treatment feasibility, and post-procedural follow-up.

The primary goal in treating visceral artery aneurisms is early detection and intervention in the asymptomatic stage. Ideally, the chosen procedure should exclude the aneurysm while preserving circulation, achievable through stent graft placement and endovascular exclusion [4]. Both our cases involved completely asymptomatic patients: one with a large HAA that enlarged by 1.1 cm over 2 years, and the other with an SAA with a maximum diameter of 3.2 cm. Considering anatomical characteristics, maximum diameter, aneurysm enlargement, location, and asymptomatic presentation, we opted for stent deployment to maintain blood flow through the affected artery. Coil embolization is the preferred choice for complex aneurysms, where stent graft placement is not feasible, or ruptured aneurisms in hemodynamically unstable patients.

Open surgical treatment remains a viable option for visceral artery aneurysms. There are several case series or individual cases found in literature that demonstrate successful outcomes with open surgical treatment [3, 5]. In most cases, open surgical treatment was conducted in ruptured or symptomatic aneurysms. However, due to its minimally invasive nature, advanced techniques, and relatively low morbidity rated, endovascular treatment is preferred for both asymptomatic and symptomatic aneurysms in anatomically suitable patients.

Complications after-endovascular treatment are generally rare or minimal, as observed in our first case, making it a favorable option over open surgery.

Conclusion

Visceral artery aneurysms represent a rare yet perilous condition. The primary objective is the early detection and treatment of these conditions, preferably in the early asymptomatic stage. Endovascular stent deployment emerges as a safe and optimal therapeutic approach for managing asymptomatic visceral artery aneurysms.

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