

## CASE REPORT / ПРИКАЗ БОЛЕСНИКА

# Partial resection of the splenic cyst using radiofrequency ablation system

Srđan S. Putnik<sup>1</sup>, Miroslav Ilić<sup>2,3</sup><sup>1</sup>Vršac General Hospital, Department of General Surgery, Vršac, Serbia;<sup>2</sup>Institute for Pulmonary Diseases of Vojvodina, Clinic for Thoracic Surgery, Sremska Kamenica, Serbia;<sup>3</sup>University of Novi Sad, Medical Faculty, Novi Sad, Serbia**SUMMARY****Introduction** This paper presents a case of a patient with a benign splenic cyst, which was removed by way of partial resection of the spleen.**Case outline** The patient's benign cyst in the lower pole of the spleen was excised using single Cool-tip™ radiofrequency ablation electrode (Cool-tip RF Ablation System, Covidien™, Dublin, Ireland). More than half of the spleen was excised without setting stitches to the splenic parenchyma and without any other hemostyptics.

This way, the function of the spleen was preserved, which was proven with scintigraphy and computed tomography two years after the intervention.

**Conclusion** Radiofrequency ablation system with internally cooled needles can be used successfully and without any consequences to the organ, especially in case of large benign splenic cysts, when it is necessary to preserve the function of the spleen.**Keywords:** spleen; partial splenectomy; radiofrequency ablation**INTRODUCTION**

Preservation of the spleen and its function is paramount for resistance to infections and prevention of overwhelming post-splenectomy infection [1, 2]. Spleen preservation is imperative in all cases of spleen surgery that allow it. This includes traumas and other pathomorphologies of the spleen, namely tumours, metastatic changes, and hypersplenism [3, 4, 5]. Splenic cysts occur in approximately 0.07% of the cases and are usually asymptomatic until their growth starts putting pressure on the surrounding organs [6, 7]. They are usually benign, but cysts of other etiology must be excluded prior to surgery. This primarily means hydatid cysts. In case of elective surgery of benign cysts, one must preserve the function of the spleen and attempt partial resection. Partial resection of the spleen is carried out using various surgical techniques [8, 9]. As of 2003, it is possible to use radiofrequency (RF) ablation system in the so called bloodless partial splenectomy [10].

**CASE REPORT**

A 34-year-old Caucasian woman reported to the doctor due to vague symptomatology in the upper abdomen. The ultrasound and computed tomography of the abdomen revealed a large 10.5 cm cyst in the lower pole of the spleen, covering 50% of the organ (Figure 1). Elective surgery was proposed to the patient. During the preoperative treatment, the patient was

tested for carcinoembryonic antigen and carbohydrate antigen (CA 19-9) tumour markers. Hydatid disease was excluded with the serological test. During the preoperative treatment, the patient received antibiotic prophylaxis and low-molecular-weight heparin.

The upper abdomen is accessed by way of left-side paracostal laparotomy. The spleen is mobilized toward the midline, by cutting the splenophrenic and splenocolic ligaments. After exposing the entire organ without clamping arterial or venous blood vessels, a series of ablation-induced coagulation necroses are made on the splenic parenchyma by a single Cool-tip™ RF ablation electrode (Cool-tip RF Ablation System, Covidien™, Dublin, Ireland), which is then cut with a scalpel, without placing a single stitch to the remaining splenic parenchyma (Figure 2). This method ensures resection of the entire lower pole of the spleen that contains the cyst. A drainage tube is positioned



**Figure 1.** Preoperative computed tomography with the cyst in the spleen

**Примљено • Received:**

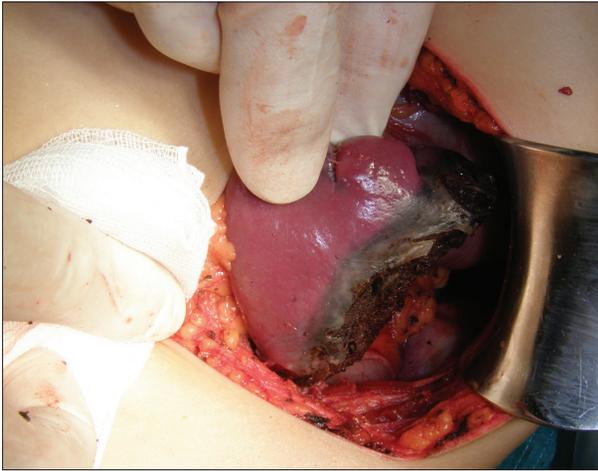
June 7, 2016

**Прихваћено • Accepted:**

June 29, 2016

**Online first:** March 3, 2017**Correspondence to:**

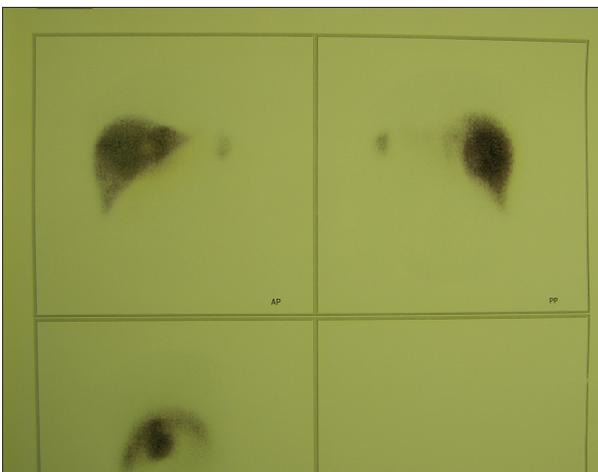
Srđan S. PUTNIK  
Department of General Surgery  
Vršac General Hospital  
Abraševičeva bb  
26300 Vršac  
Serbia  
[putniksrđjan@outlook.com](mailto:putniksrđjan@outlook.com)



**Figure 2.** Spleen surface after radiofrequency ablation



**Figure 3.** Computed tomography two days after the operation



**Figure 4.** Spleen scintigraphy one month after the intervention

in the subphrenic space, and the operative wound is closed by anatomic layers. There were no complications, namely bleeding, neither during nor after the intervention. A follow-up computed tomography scan was performed two days after the operation in order to observe the blood vessels and ascertain the vitality of the splenic tissue (Figure 3).

On the fourth postoperative day, the drainage tube was removed and the patient discharged with normal vital parameters and on oral nutrition. Spleen scintigraphy with



**Figure 5.** Computed tomography two years after the operation

labelled red blood cells was performed one month after the intervention and revealed preserved function of the somewhat smaller spleen (Figure 4). Computed tomography two years after the operation also showed normal findings (Figure 5). The operation was performed at the Clinic for Thoracic Surgery, Institute for Pulmonary Diseases in Sremska Kamenica, Serbia.

## DISCUSSION

Surgical techniques for preserving the function of the spleen were developed during the 1980s and 1990s [11, 12, 13]. These were particularly significant for pediatric traumas, when non-operative treatment was recommended in case of blunt traumas in children, and later in adults as well [14, 15]. These techniques always implied the mobilization of the spleen and selective ligating of arterial blood vessels, as well as the use of absorbable sutures or specially designed nets made of the same absorbable material [16, 17, 18]. Radiofrequency ablation and its use in spleen surgery have been known since first reports in 2003 by Habib et al. [10]. This technique has been widely used in liver surgery [19]. A series of coagulation necroses induced on the splenic parenchyma results in a completely avascular resection surface after cutting the splenic tissue. This is achieved with internally cooled needles with ablation sphere of approximately 3 cm. The application of RF ablation system on one part of the splenic parenchyma does not damage the function of the remaining part of the spleen after a partial resection, which was proven with scintigraphy. In particular, this technology could be implemented during laparoscopic partial resection of benign splenic cysts, provided safe access is ensured for the electrode through the anterior or anterolateral abdominal wall. We believe that this is possible, since the internally cooled needle remains cool during the emission of RF waves.

The use of RF ablation system with internally cooled needles can be used successfully and without any consequences to the organ, especially in case of large benign splenic cysts, when it is necessary to preserve the function of the spleen.

## REFERENCES

- Di Sabatino A, Carsetti R, Corazza GR. Post-splenectomy and hyposplenic states. *Lancet*. 2011; 378(9785):86–97.
- Ingle SB, Hinge Ingle CR, Patrike S. Epithelial cysts of the spleen: a minireview. *World J Gastroenterol*. 2014; 20(38):13899–903.
- Martins GL, Bernardes JP, Rovella MS, Andrade RG, Viana PC, Herman P, et al. Radiofrequency ablation for treatment of hypersplenism: A feasible therapeutic option. *World J Gastroenterol*. 2015; 21(20):6391–7.
- Liu Q, Song Y, Zhou N, Xu X, Wang ZJ. Radiofrequency ablation of splenic tumors: a case series. *Gastrointest Liver Dis*. 2013; 22(1):105–8.
- Wu Y, Wan L, Li P, Zhang Y, Li M, Gong J, et al. Application of radiofrequency ablation for splenic preservation. *J Surg Res*. 2015; 193(2):781–7.
- Vo QD, Monnard E, Hoogewoud HM. Epidermoid cyst of the spleen. *BMJ Case Rep*. 2013; 2013.
- Robbins FG, Yellin AE, Lingua RW, Craig JR, Turrill FL, Mikkelsen WP. Splenic epidermoid cysts. *Ann Surg*. 1978; 187(3):231–5.
- Liese J, Kohler S, Moench C, Bechstein WO, Ulrich F. Partial spleen resection with a radiofrequency needle device- a pilot study. *Langenbecks Arch Surg*. 2013; 398(3):449–54.
- Karadayi K, Turan M, Sen M. A new technique for partial splenectomy with radiofrequency technology. *Surg Laparosc Endosc Percutan Tech*. 2011; 21(5):358–61.
- Habib NA, Spalding D, Navarra G, Nicholls J. How we do a bloodless partial splenectomy. *Am J Surg*. 2003; 186(2):164–6.
- Feliciano DV, Spjut-Patrinely V, Burch JM, Mattox KL, Bitondo CG, Cruse-Martocci P, et al. Splenorhaphy. The alternative. *Annals of Surgery*. 1990; 211(5):569–82.
- Lange DA, Zaret P, Merlotti GJ, Robin AP, Sheaff C, Barrett JA. The use of absorbable mesh in splenic trauma. *J Trauma*. 1988; 28(3):269–75.
- Kram HB, del Junco T, Clark SR, Ocampo HP, Shoemaker WC. Techniques of splenic preservation using fibrin glue. *J Trauma*. 1990; 30(1):97–101.
- Stassen NA, Bhullar I, Cheng JD, Crandall ML, Friese RS, Guillaumondegui OD, et al. Eastern Association for the Surgery of Trauma. Selective nonoperative management of blunt splenic injury: an Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg*. 2012; 73:S294–300.
- Lynn KN, Werder GM, Callaghan RM, Sullivan AN, Jafri ZH, Bloom DA. Pediatric blunt splenic trauma: a comprehensive review. *Pediatr Radiol*. 2009; 39(9):904–16.
- Eskandarlou M, Derakhshanfar A. Introduction of a simple technique for partial splenectomy in multiple trauma patients. *Iran Red Crescent Med J*. 2013; 15(12):e9072.
- Fingerhut A, Oberlin P, Cotte JL, Aziz L, Etienne JC, Vinson-Bonnet B, et al. Splenic salvage using an absorbable mesh: feasibility, reliability and safety. *Br J Surg*. 1992; 79(4):325–7.
- Morgenstern L, Shapiro SJ. Techniques of splenic conservation. *Arch Surg*. 1979; 114(4):449–54.
- Weber JC, Navarra G, Jiao LR, Nicholls JP, Jensen SL, Habib NA. New technique for liver resection using heat coagulative necrosis. *Ann Surg*. 2002; 236(5):560–3.

## Парцијална ресекција слезине коришћењем радиофреквентног аблационог система

Срђан С. Путник<sup>1</sup>, Мирослав Илић<sup>2,3</sup>

<sup>1</sup>Општа болница Вршац, Служба опште хирургије, Вршац, Србија;

<sup>2</sup>Институт за плућне болести Војводине, Клиника за грудну хирургију, Сремска Каменица, Србија;

<sup>3</sup>Универзитет у Новом Саду, Медицински факултет, Нови Сад, Србија

### САЖЕТАК

**Увод** Циљ рада је да прикаже болесници са бенигном цистом слезине која је уклоњена парцијалном ресекцијом слезине.

**Приказ болесника** Код болеснице са бенигном цистом доњег пола слезине помоћу једне *cool-tip*<sup>™</sup> електроде за радиофреквентну аблацију (*Cool-tip RF Ablation System, Covidien*<sup>™</sup>, Даблин, Ирска) одстрањено је више од половине слезине без постављања шавова на паренхим слезине и коришћења других хемостатских метода. На овај начин

презервирана је функција слезине која је доказана скинтиграфски и компјутеризованом томографијом две године након интервенције.

**Закључак** Употреба радиофреквентног аблационог система са интерно хлађеним иглама може се применити успешно и без последица по орган код великих бенигну циста слезине.

**Кључне речи:** слезина; парцијална спленектомија; радиофреквентна аблација