

RADIOFREQUENCY HAEMOSTASIS AS AN OPTION FOR ORGAN PRESERVATION IN SPLENIC TRAUMA

HEMOSTASE POR RADIOFREQUÊNCIA COMO OPÇÃO PARA PRESERVAÇÃO DE ÓRGÃOS NO TRAUMA ESPLÊNICO

Rita CAMARNEIRO¹, António Pedro GOMES², Vítor NUNES²

¹ Departamento de Cirurgia do Centro Hospitalar do Oeste – Hospital das Caldas da Rainha, Caldas da Rainha, Portugal

² Departamento de Cirurgia do Hospital Professor Doutor Fernando Fonseca, Amadora, Portugal

Correspondence: Rita Camarneiro (rmisc_16@hotmail.com)

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ABSTRACT

Introduction: The treatment of splenic trauma has undergone several changes in recent years. Mortality occurs due to hypovolemic shock, which is sometimes due to delay in treatment. Recently, attempts have been made to preserve the organ being splenectomy preferred for patients with failure of conservative approach or with haemodynamic instability at presentation. Radiofrequency is a modality that is gaining importance in the treatment of splenic trauma. This manuscript presents the case of a patient, with splenic trauma, submitted to splenic haemostasis by radiofrequency, with organ preservation. **Case report:** Young woman, victim of a road accident, which resulted in thoracic and abdominal trauma (splenic – grade IV American Association for Surgery Trauma). Initially, given the patient haemodynamic stability, an expectant attitude was chosen. However, due to clinical and analytical aggravation, it was necessary to proceed to a surgical intervention. Splenic haemostasis was performed using radiofrequency. **Discussion / Conclusion:** When selecting the approach to be followed in splenic trauma, it is important to consider the hemodynamic stability of the patient, the results of complementary diagnostic tests and the resources available. Organ preservation is currently the gold standard, and several therapeutic modalities are available that allow this objective. Radiofrequency has an already known haemostatic effect and although it is not yet widely used in the management of splenic trauma, it has been shown to be safe and effective, facilitating spleen preservation.

Keyword: *spleen, trauma, radiofrequency.*

RESUMO

Introdução: O tratamento do trauma esplênico sofreu, nos últimos anos diversas modificações. A mortalidade devido ao choque hipovolémico, decorre muitas vezes devido ao atraso no tratamento. Recentemente, têm sido feitas tentativas de preservação do órgão, sendo a esplenectomia indicada para doentes em que a abordagem conservadora não é uma opção considerável ou com instabilidade hemodinâmica. A radiofrequência é uma opção terapêutica que está a ganhar importância no tratamento do trauma esplênico. Este manuscrito apresenta um doente, com trauma esplênico, submetido a hemóstase esplênica por radiofrequência, o que possibilitou a preservação do órgão. **Descrição do caso:** Mulher jovem, vítima de acidente de viação, resultando em trauma torácico e abdominal (lesão esplênica – grau IV segundo a classificação da American Association for Surgery Trauma). Inicialmente, dada a estabilidade



hemodinâmica do doente, optou-se por uma atitude conservadora. No entanto, devido ao agravamento clínico e analítico, foi necessário realizar intervenção cirúrgica para controlo da hemorragia. A hemostase esplénica foi realizada com recurso à radiofrequência. **Discussão/Conclusão:** Ao selecionar a conduta a ser seguida no trauma esplénico, é importante avaliar a estabilidade hemodinâmica do doente, os resultados dos exames auxiliares de diagnóstico e os recursos disponíveis. A preservação do órgão é atualmente a opção a considerar, estando atualmente disponíveis várias modalidades terapêuticas que permitem esse objetivo. A radiofrequência tem um efeito hemostático já conhecido e, embora ainda não seja amplamente utilizada no tratamento do trauma esplénico, tem se mostrado segura e eficaz, facilitando a preservação do baço.

Palavras-chave: baço, trauma, radiofrequência.

INTRODUCTION

About 25% of polytraumatized patients have intra-abdominal injuries, with the spleen being the second most affected organ, after the liver¹⁻³. The mortality rate of patients with splenic trauma is approximately 9%, due to hypovolemic shock, mostly associated with delay in treatment¹.

The approach to splenic injuries has undergone major changes in recent years, currently giving greater emphasis to the preservation of the organ and maintenance of its immunological and haematological functions³⁻⁸.

Currently, the organ-sparing approach (OSA) is the gold standard for the management of splenic trauma, whether through non-operative management (NOM), whether or not associated with endovascular intervention (splenic artery embolization – SAE) or other minimally invasive approaches, such as application of mesh, fibrin glue or radiofrequency ablation (RFA)^{2-4,6,8}.

RFA has multiple applications, namely in the treatment of liver and lung tumours and there are some cases described in the literature of its application in haemostasis of the spleen after abdominal trauma^{4,6,9}.

Splenectomy (partial or total) is reserved primarily for patients with hemodynamic instability and for those in whom OSA fails^{2,3,6,8}.

The main objective of this work is to present an organ-sparing approach (OSA) in a patient with

major splenic trauma, with intra operative RFA, after the collapse of non-operative management (NOM).

CASE REPORT

A 30-years-old female, a victim of a traffic accident, was admitted to the emergency department. She was hemodynamically stable, with a Glasgow scale of 15, highlighting only the peripheral oxygen saturation of 93% with oxygen at 3L/min.

Analytically with haemoglobin (Hb) of 12.5g/dL. Cranial, thoracic, abdominal and pelvic computed tomography (CT) scan was performed, which showed a fracture of the 6th to 10th costal arches on the left with hemopneumothorax, blunt abdominal trauma, splenic lacerations (grade IV American Association for Surgery Trauma – AAST) without contrast extravasation and mild head trauma (Figure 1).

A chest tube was placed on the left and the patient was admitted to the intensive care unit.

In the first 48hours under NOM, there was a drop in Hb from 12.5g/dL to 7.7g/dL, with hypotension and need for transfusion of concentrated erythrocytes (Graphic 1).

A CT scan showed the persistence of splenic lacerations, with an increase in the hemoperitoneum (Figure 2). The sudden clinical worsening, through the increase in hemoperitoneum, and the



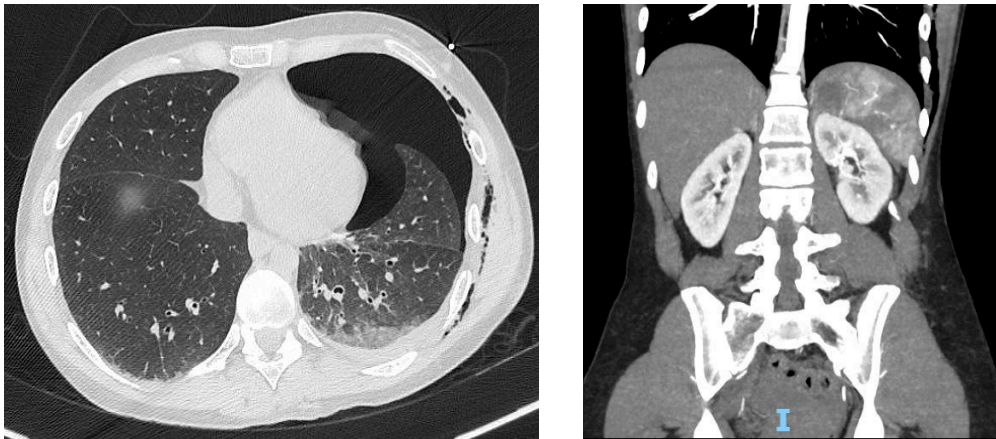
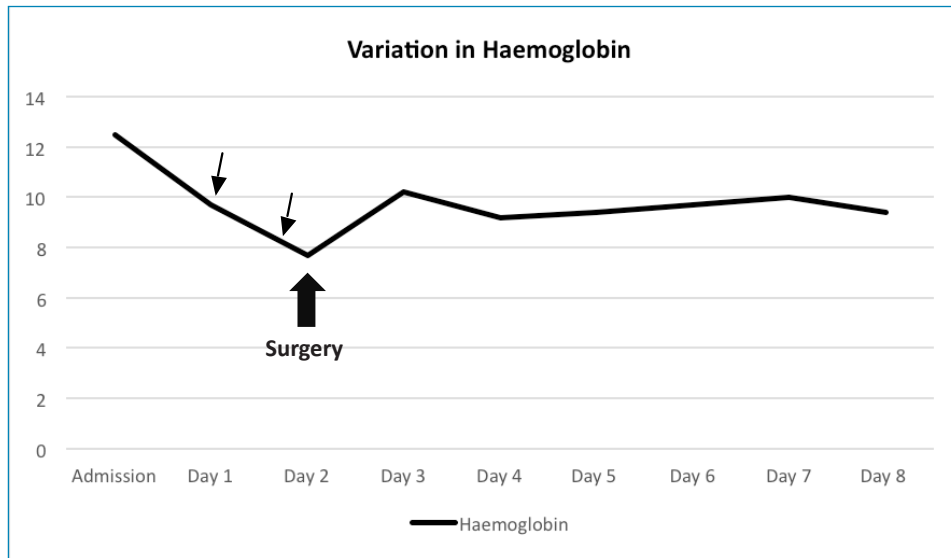


FIGURE 1 – CT scan performed on admission showing fracture of the 6th to 10th costal arches on the left with hemopneumothorax, blunt abdominal trauma, splenic lacerations (grade IV American Association for Surgery Trauma - AAST) without contrast extravasation.



GRAPHIC 1 – Variation in haemoglobin values since admission. The day of the surgery is indicated by the larger arrow, which corresponds to the day on which the haemoglobin value was lowest. The smaller arrows identify the days on which concentrated red blood cells transfusions were performed.



FIGURE 2 – Reassessment computed tomography scan at 48 hours, showing splenic tear (grade IV American Association for Surgery Trauma) and increased intra-abdominal free fluid (hemoperitoneum).



decrease in haemoglobin, motivated the surgical intervention.

An emergency laparotomy was performed. The systematic abdominal evaluation showed a high volume of hemoperitoneum in all quadrants. Spleen trauma was the only bleeding source that was found with laceration of the anterointernal aspect of the spleen.

Since spleen lacerations were not suitable for electrocoagulation, due to their severity, or argon coagulation even with haemostatic adjuvants, RFA haemostasis of the splenic laceration was attempted. After mobilization of the spleen and isolation of the splenic hilum, the splenic artery was clamped to facilitate haemostasis. The radiofrequency needle was held against the laceration and energy is applied until the bleeding has stopped.

In the postoperative period, the evolution was favourable. There is no need for transfusion of concentrated erythrocytes, and the hemopneumothorax was resolved.

DISCUSSION

Splenic trauma is no longer synonymous of splenectomy¹⁰. Currently, the preservation of the spleen is increasingly advocated, either by NOM, with the aid of arterial embolization or through parenchyma-sparing surgery¹⁰. This effort is because splenectomised patients are at greater risk of infections by encapsulated bacteria and vascular thrombosis^{1,2,6}.

Choosing a conservative approach to splenic trauma requires an accurate diagnosis (including associated injuries) and an assessment of the severity of the injury, continuous monitoring of haemodynamic status, clinical signs and symptoms of the patient and blood samples (usually in the Intensive Care Unit (ICU)) as well as interventional radiology and operating room readily available in case of sudden deterioration².

Intravenous contrast CT scan, with an arterial and portal venous phase, provides the information needed to assess the severity of splenic trauma². CT is superior to ultrasound in the evaluation of a polytraumatized patient, allowing the evaluation of bone, hollow, solid and intracranial lesions. On the other hand, ultrasound with contrast is a good test for bedside follow-up of patients with splenic trauma under NOM (although not always available and operator-dependent)².

High-grade splenic injury, large-volume hemoperitoneum, associated intra-abdominal or intracranial injuries, and altered consciousness are factors associated with failure of NOM^{2,4}.

Most authors suggest that SAE is an effective and safe approach to splenic trauma and should be reserved for high-grade injuries and cases of active haemorrhage². Angioembolization is a useful tool and may improve the success of NOM.

Nevertheless, SAE was not performed in this case report due to sudden clinical deterioration associated with a drop in haemoglobin levels^{1,2}.

RFA is a therapeutic modality used mainly in liver tumours^{4,5,9}. Its well-known haemostatic effect is due to protein denaturation, vessel wall injury, coagulation of the blood proteins, and formation of an occlusive coagulum, which are produced by the increase of the tissue temperature^{4,7}. Its use in the treatment of splenic trauma, although not frequent, is safe and allows effective control of haemorrhage, as well as avoiding more aggressive strategies (eg. splenectomy)^{4,6,9}.

RFA, being a therapeutic modality that can even be applied intraoperatively (open way or laparoscopic) or under local anaesthesia, guided by ultrasound or CT scan, has the advantage of being able to be applied to these cases and facilitating the preservation of the spleen⁴.

The major advantage of the RFA is that offers control of bleeding from splenic parenchyma without the need for control of the splenic hilum, with minimal risk of bleeding. However, RFA hardware is not always readily available⁵.



The presented case shows a spleen-sparing approach after the failure of NOM. Through the application of radiofrequency, it was possible to avoid splenectomy in a young patient with all the benefits it brings in terms of protection against possible infections.

The mobilizations of the spleen and the control of its vascular hilum, allows the application of RFA with greater safety. Since it is a technique still little explored in this area of splenic haemostasis, control of the hilum before RFA application makes it technically easier to control bleeding and stabilize the patient in case of failure.

CONCLUSION

Spleen preserving procedures emerged as a standard safe option for stable patients. It includes non-operative management and an organ-sparing approach.

Splenic artery embolization seems to improve the non-operative management success rate. It requires Intensive Care Unit and Interventional Radiology.

Radiofrequency ablation, although infrequent should be kept in mind as a safe option for spleen preserving surgery, after the failure of non-operative management.

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