Bleeding control by radiofrequency in penetrating trauma of the liver

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SUMMARY: Bleeding control by radiofrequency in penetrating trauma of the liver.

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Radiofrequency (RF) is a high frequency alternating current that causes thermal coagulation and protein denaturation when delivered by thin electrodes in the parenchymal tissue (1). Termocoagulation by RF is increasingly and widely used for ablation of liver neoplasms (2). Reported complications are necrosis or perforations of surrounding organs or involvement of the biliary tree with subsequent abscess or biliary fistula.

Recently, innovative uses of RF were proposed, like the use of RF to assist liver resection (3), to help partial splenectomy (4), or to treat ruptured hepatocellular carcinoma (5).

A 21 years old man was admitted for massive haemorrhage from a right thoraco-abdominal knife wound. Massive haemothorax was drained but arterial bleeding was caused by a deep penetrating wound on liver segment VIII. During operation, considering the difficult exposure of the source of bleeding, it was thought to stop haemorrhage using RF termocoagulation, under ultrasonographic guidance. Termocoagulation of the pedicle of the liver segment VIII was performed.

In this patient with haemorrhagic shock the RF method for bleeding control was very easy and effective, and avoided risks of morbidity due to a major procedure.

Case report

A 21 years old Chinese man was referred to our hospital after a knife wound in the right anterior lower thorax, under the right sixth rib. At admission chest X-ray showed gross right haemothorax (Fig. 1) and ultrasonography (US) demonstrated a small hemoperitoneum and inhomogeneity on the liver segment VIII.

After US, 2500 cc of blood were drained from the chest, and the patient was taken in the operative room in impending shock.
At preliminary exploration of the wound, it was found that the active arterial bleeding was originating from the injured liver, and the chest cavity filled of blood through the wounded diaphragm. At midline laparotomy, it was confirmed that arterial bleeding came from a deep cut, about 8-10 cm, in liver segment VIII. During Pringle’s manoeuvre, it was attempted to obtain hemostasis by suturing or clipping the source of bleeding, but the cut was too deep, and the attempts to achieve haemostasis by stitches and clips were unsuccessful due to inadequate exposure. So, under clamping of the hepatic pedicle, we used a RF Cool-tip single 200 Watt electrode needle trying to control haemorrhage. The first attempt was made putting the needle inside the wound, and was unsuccessful. Then, we inserted the needle in the parenchyma, under US guidance, along the wound, about 5 mm from the cut surface, reaching the pedicle of segment VIII. After the first cycle of 6 minutes arterial hemorrhage completely stopped. Haemostasis was completed with 2 other cycles of 5 minutes in the opposite side of the wound. The right lung was inspected through the diaphragm to exclude other sources of bleeding. The diaphragm was sutured with interrupted stitches. Ten units of red blood cells were transfused during operation.

After a short stay in the intensive care unit, the patient came back to our ward. Postoperative course was completely uneventful, and the patient was discharged on the 6th post-operative day. Two months after, RMN cholangiography shows the efficacy of coagulation on the liver (Fig. 3).

**Discussion**

Liver trauma is an important cause of morbidity and mortality, depending on the severity of trauma, assoc-
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References