The treatment of choice of extrahepatic portosystemic shunts (EPSS) is the surgical one since about 8 to 9 out of 10 dogs that are operated manage to live long term without associated clinical symptoms\textsuperscript{1-6}.

All patients who are operated in our centre, no matter if they have or not associated neurological symptoms, undergo 4 weeks of medical treatment. This treatment consists of hepatic diet only, lactulose 1 to 1.5 ml PO BiD or TiD, metronidazole 7.5 mg/kg BiD PO and potassium bromide 60-80 mg/kg SiD PO. We have operated about 30 patients with this protocol, learned during my stage in Liège, Belgium, and we have had only one episode of postoperative seizures. We seriously doubt that he was correctly medicated.

Between the ameroid ring and the band of cellophane paper I choose the ameroid ring. Although the literature shows that the clinical results are similar with both techniques, in the first cases I used cellophane paper bands in Spain, I had a patient who did not have any inflammatory reaction, and there was abundant blood flow through the EPSS. At the Hospital of the Veterinary School of Liège, where I was trained, we had a couple of cases of EPSS operated with cellophane paper bands which left almost not closed and therefore I decided to return to the ameroid rings. The idea is that, although up to 22\% of dogs have been described with possible persistence of blood flow through the PSS after having placed an ameroid ring\textsuperscript{3}, these persistences have been documented 8 weeks postoperatively and we assume that the EPSS are still closing progressively. Further, the ameroid ring is a product manufactured for the progressive closure of blood vessels, while the cellophane paper is not manufactured for medical use and therefore it is very difficult to know whether the transparent paper that you acquire at the florist shop or the stationery is really cellophane or any other type of transparent paper.

The ameroid ring should always be placed as close as possible to the drainage lobe in the caudal vena cava, in the phrenic vein or in the azygos vein. Thus, for EPSS that drain into the caudal vena cava, the rings are placed in the area closest to the caudal vena cava, usually in the epiploic foramen (Image 1).

Image 1: Ameroid ring placed around a PSS that drains into the caudal vena cava at the epiploic foramen level. Vena cava caudal (green arrows), hepatic artery creating the ventral edge of the epiploic foramen (blue arrows).
For EPSS draining into the azygos vein, I place the ring as close as possible to the diaphragm, before the EPSS passes through it, in order to drain the azygos into the thoracic cavity. (Image 2).

Image 2: A) Intraoperative image of dissection of a portosystemic shunt portoazygos in the esophageal hiatus, just before piercing it to drain into the azygos vein, intrathoracically. A straight angle clamp is used to dissect around the shunt. B) Image of the ameroid ring placed around the shunt.

For EPSS draining into the phrenic vein (usually left), the ring will be placed just in the insertion between the EPSS and the phrenic vein, into the thickness of the diaphragm. In these cases it is very useful to make an incision of the diaphragm fascia in order to be able to dissect the EPSS more easily. This incision is made 1-2 mm from the EPSS with a scalpel blade number 11 mounted on a handle no. 7 that allows us to easily reach this area. Once the incision is made in the fascia, the dissection around the EPSS is much simpler. Since the diaphragm is a mobile structure, it is essential to be very careful not to puncture the EPSS with the blade when the patient breathes and to move the diaphragm and the EPSS caudally with it.

The size of the ring to be chosen depends on the size of the EPSS measured in the preoperative ultrasound. The internal diameter of the EPSS must be big enough so that it contacts with the walls of the glass but without compression. Therefore, the diameter of the shunt should be measured ultrasonographically in the part where it drains into the caudal vena cava, into the phrenic vein, or into the part through which the diaphragm passes when the affected vein is azygos (Image 3).
Some EPSS may have complex configurations with forward and backward loops from the origin to the drainage sites. Others may have different branches that nourish it, and double congenital EPSS also exist. Theoretically, the ameroid ring or the cellophane paper band should be placed as close as possible to the vein into which the EPSS drains, in order to include all the loops and branches that drain the EPSS in the future attenuation. In order to avoid that double EPSS remain open when we attenuated only one, an intraoperative portography with fluoroscopy was classically performed. This test is done by injecting an iodinated contrast into a jejunal vein. From here, it will go to the mesenteric vein and then to the portal, to the EPSS and to the vein into which it drains. At the place where the ring or the cellophane band will be placed, a tourniquet with a silk thread is placed, tightened, and contrast is injected again. If the only EPSS is the identified one and there are no branches or cranial loops where the suture has been placed, it will be an optimal place to place the cellophane ring or band, we will stop seeing the EPSS in fluoroscopy and we will see the contrast fill all the porta extra system and later the intrahepatic system.

We perform a procedure similar to this intraoperative contrast, but using intraoperative ultrasound instead of fluoroscopy, avoiding the irradiation to the patient and the operating room staff. We place a silk tourniquet in the place where we will place the ring, inject saline solution with microbubbles transplenicly without closing the tourniquet and place the transducer of the ultrasound transdiaphragmatically to see the right atrium. If the EPSS is open, microbubbles will appear in the right atrium. The tourniquet is then closed and the saline is injected again with the microbubbles. If they are no longer seen in the right atrium, it means that the EPSS is one and that this would be the location to place the ameroid ring or the band of cellophane paper.

REFERENCES

