Obstruction of Vena Cava and Collateral Flow after Abdominal Reconstruction for Gastroschisis

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Summary: The upper limit of intra-abdominal pressure after closure of gastroschisis has been suggested around 20 mm Hg. An acute abdominal compartmental syndrome may produce intestinal ischemia with perforation and hepatic or renal failure. We present a case of a baby born with gastroschisis and ileal atresias 2 decades ago. The closure of the defect entailed a borderline abdominal compartmental syndrome with caval occlusion and development of collateral venous circulation. This was evidenced by a phlebographic study at the age of 8. At the age of 19, the patient continued to show a superficial, varicose net and some aesthetic concerns. This minor condition seems not previously reported. The authors intend to raise awareness about current methods for indirect assessment of intra-abdominal pressure when performing abdominal reconstruction for a gastroschisis defect. (Plast Reconstr Surg Glob Open 2015;3:e304; doi: 10.1097/GOX.0000000000000276; Published online 18 February 2015.)

A male newborn was delivered at 36 weeks by Cesarean section after an ultrasound examination that showed images of gastroschisis. His mother was a 17-year-old primigesta. Birth weight was of 2860 g, and Apgar scores were 9/10/10. A duodenal perforation and multiple ileal atresias were visible at the operation theater, as well as several accessory spleens. As the conglomerate of atretic segments seemed swollen and extremely difficult to individualize, the surgeon of the time decided to perform a second procedure some days later. Duodenostomy and primary abdominal closure were performed as a first operation. According to the operatory report of our former colleague, “bowel loops were easily reintegrated without much pressure into the abdomen.” The report does not offer full details about the technique for primary abdominal closure, but current inspection of the vertical skin scar suggests a direct approach of peritoneum, muscle, and skin in separate layers and probe-coated, transverse retention sutures. Parenteral nutrition was onset, and a second procedure was performed at 37 days for multiple anastomosis and resection of atretic, perforated segments. The remaining small intestine was about 70-cm long. The surgeon followed the scar line of the first operation by resecting its borders and reapproaching them in the same vertical fashion.

Attempts of oral feeding were burdened by sepsis (Staphylococcus epidermidis) and by several occlusion and diarrhea episodes. The central line had to be changed 2 times (neither of them through the femoral vessels). The last substitution was performed through left saphenous vein and, according to the surgeon’s notes, the intraoperatory C-arm radioscopy showed how the catheter followed anomalous ways around the vena cava. Ultrasound showed what seemed an infraumbilical hypoplastic inferior cava and azygos vein dilatation. Finally, the baby could be discharged on oral feeding at the age of 4 months.

The patient had a new episode of bowel obstruction at the age of 8. Moreover, he had developed a notorious development of superficial infraumbilical veins. After usual management (nihil per os, nasogastric probe), a phlebographic examination showed an
established occlusion of infrahepatic vena cava and a parallel net with several varicosities (Fig. 1).

Fortunately, he developed without any major occlusive episodes during the following years. He has worn adapted, compressive girdle and pants that he tolerates in everyday living. However, he feels bothered and avoids bathing in public places (Fig. 2).

DISCUSSION

Thrombotic complications derived from central line insertion may occur far from the catheter tip,1 but it is difficult to figure out how such a massive thrombosis could skip cardiac, pulmonary, and systemic passage.

So, although a congenital vascular malformation or even a distant venous thrombosis could be a possible explanation, this case probably illustrates long-term outcomes of a borderline abdominal compartment syndrome. The upper limit of intra-abdominal pressure for abdominal reconstruction in gastroschisis has been suggested around 20 mm Hg (27.2 cm H2O).2 Abdominal compartmental syndrome, a well-known complication of primary closure,3,4 may produce intestinal ischemia with perforation and hepatic or renal failure. More than 30 years ago, the fingers of surgeons on abdominal great vessels, the size of the defect, intraoperative respiratory and cardiac rates, and perfusion of lower limbs were the

Fig. 1. Phlebographic study through right inguinal and brachial access showed an abnormal drainage. Suprahepatic cava was permeable though azygos vein appeared slightly wider than usual. A dilated, venous net showed foci of established varicosity.

Fig. 2. Superficial venous flow at the age of 19.
only available guides. Some indirect methods for assessment have appeared in the last decades, including nasogastric probes,\textsuperscript{5} bladder catheters,\textsuperscript{6} end-tidal carbon dioxide,\textsuperscript{7} and airway pressure.\textsuperscript{8} Most anesthesiologists, who were instructed to manually ventilate during reconstruction for gastroschisis in former years, seem to prefer this last method. On the other hand, many pediatric intensive care units rely on measurement of bladder pressures for postoperative monitoring.\textsuperscript{9,10}

**CONCLUSION**

As for all accounts that involve some kind of iatrogeny, this case report should be taken as a warning and a remembrance of the times when indirect measurement of intra-abdominal pressure was not so easily available as nowadays.

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