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SURGICAL TECHNIQUE

Difficult hemostasis during radical pelvic surgery

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Bleeding that arises during pelvic surgery can be difficult to control and potentially lethal. We describe here the different methods for managing hemorrhage that arises during radical pelvic surgery (exenteration) and during extensive resections (resection of the sacrum or the lateral surfaces of the pelvis).

The techniques to deal with complications of radical surgery require a prolonged apprenticeship and experience in radical extirpative surgery, as well as certain flexibility and adaptability since a given intervention is rarely identical to preceding cases. The principal techniques that can be performed [1—3] as well as different modes of reconstruction [4,5] have been described in numerous previous issues of the Journal of Visceral Surgery. Decision-making and ingenuity are often necessary to accomplish a complete resection with tumor-free margins of pelvic malignancies. The procedure is seldom stereotypical. The surgeon must be aware of the numerous concerns that may arise in the few minutes before resection of the tumoral mass. The last phases of the resection are often performed on the underside of the mass with reduced visibility. The surgeon must be prudent to avoid injury to critical structures as the resection nears completion.

When abnormal bleeding without any evident explanation develops in the early stages of resection by laparotomy, the surgeon's first concern is to verify the position of the retractors. Vena caval compression by the retractors may impede venous return resulting in bleeding due to backpressure in the pelvic veins. Coagulation parameters should also be verified.

When venous bleeding occurs, optimal management demands a methodical approach. Bleeding may arise from the pre-sacral venous plexus, or from branches of the internal iliac vein.

It is important to remain calm and to control the bleeding with compression or tamponnade by packing. Once the bleeding is under temporary control, one can ask for the participation of an additional surgeon, optimize esposure and illumination of the surgical field and of suction apparatus, enlarge the incision if necessary, or bring additional retractors into play. The anesthesiology team should be informed of the anticipated bleeding so that necessary replacement blood products are readily available in the operating room. Often, compression applied for ten minutes or more may be sufficient to reduce or arrest the bleeding.

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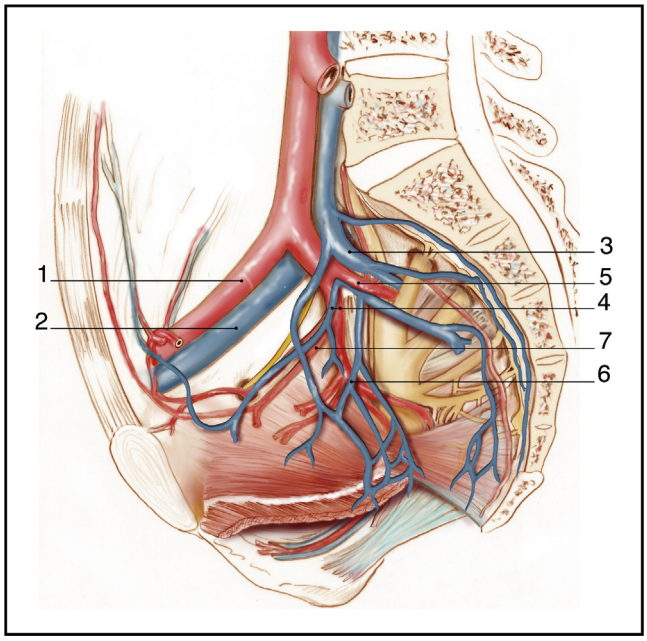
1 Anatomical reminder

Surgeons should be aware of the various potential sources of pelvic bleeding and must exercise constant attention to avoid injuries to the external iliac artery, the internal and external iliac veins, the obturator arteries and veins, the middle sacral artery, and the pudendal artery with its perineal branches. The left iliac vein is particularly vulnerable since it is fixed and a venous injury may be hard to control since the vein is masked by the iliac artery.

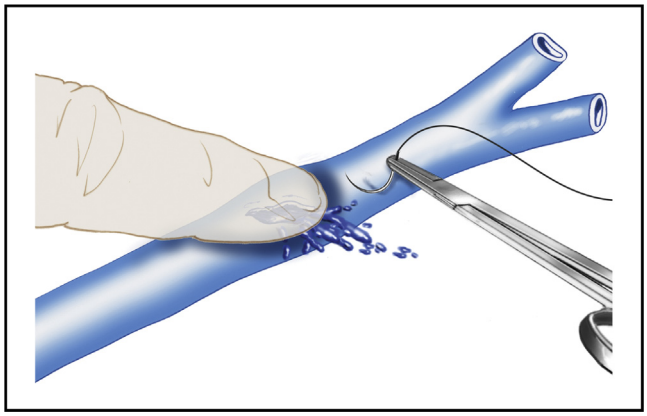
Bleeding is usually of venous origin, but in order to decrease blood loss, one must reduce the arterial influx into the pelvis. Before embarking on a resection, we routinely dissect the left and right lateral aspects of the aorta above the iliac bifurcation (without circumferential dissection), to be sure that there are no calcified plaques that would inhibit cross clamping, should this become necessary in an emergency. Before starting an exenteration, the internal iliac arteries should be ligated to decrease blood flow in the pelvis.

The internal iliac artery is dissected for two cm distal to its origin so that ligature can be performed distal to the posterior take-off of the gluteal. The arterial and venous branches from the internal iliac vessels are ligated sequentially first on one side and then on the other. If a venous tear occurs, it is better to temporize with a compressive laparotomy pad and complete the resection; hemostatic maneuvers are easier once the pelvis is emptied.



2 Venous injury managing

If a venous injury occurs, it is better to place the sutures of a running vascular closure at least 5 mm from the edges of the tear while digital compression is applied to obturate the bleeding. Traction on the suture as the obturating finger is gradually withdrawn allows hemostasis without excessive blood loss.



3 Ligation of internal iliac artery

If heavy bleeding makes it impossible to proceed with the resection, it becomes necessary to decrease the pelvic blood flow by ligation of the internal iliac arteries (if that has not already been done). The aorta can be temporarily cross-clamped placing a vascular clamp antero-posteriorly without circumferential dissection of the aorta. An assistant can hold this clamp to avoid its being dislodged or causing injury to the aorta, which would further complicate an already dangerous situation.