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Anatomical variations of the obturator veins and their surgical implications

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Summary

Purpose of investigation: The obturator veins and their network contribute to major bleeding complications during gynaecologic surgery. *Materials and Methods:* The anatomical variations of the obturator veins were studied on 106 patients in which a thorough bilateral pelvic lymphadenectomy was performed. *Results:* Symmetrical drainage on right and left sides was found in 75 cases: only in internal iliac vein in 32 cases, both in external iliac vein and internal in 41 cases, and only in external in two cases (so called "pubic vein"). In 31 procedures, asymmetric drainage was found between the two sides: one side in internal, the other side both in internal and external in 25 patients; in three patients, in external on one side and in both internal and external on the other; and in external on one side and in internal on the other side in one patient. *Conclusions:* Anatomical variations of the obturator veins appear quite often.

Key words: Obturator veins; Corona mortis; Anatomical variations; Gynaecologic surgery.

Introduction

Gray's Anatomy [1] describes the obturator vein (*vena. obturatoria*) as it begins in the upper portion of the adductor region and enters the pelvis through the upper part of the obturator foramen. It runs backwards and upward on the lateral wall of the pelvis below the obturator artery, and then passes between the ureter and the internal iliac artery, to end in the internal iliac vein. It is sometimes replaced by an enlarged pubic vein, which joins the external iliac vein. The pubic vein connects external iliac vein and the obturator vein. It ascends on the pelvic surface of the pubis with the pubic branch of the inferior epigastric artery.

To resume, Gray's Anatomy describes three situations: 1) an obturator vein draining directly into the internal iliac vein; 2) a pubic vein replacing the normal obturator vein and draining directly into the external iliac vein; 3) a normal obturator vein draining directly into the internal iliac vein, and a branch arising from it, draining into the external iliac vein - the pubic vein. However, unlike the external iliac artery, which is constant and relatively simple in its morphology, the branching pattern of the internal iliac arteries and veins is extremely variable [2]. Contrary to anatomical description, the anatomy of the obturator veins is very variable. The obturator veins and their network, historically known as "corona mortis", contribute to major bleeding complications during gynaecologic surgery. A thorough knowledge of possible variations of pelvic vasculature is very useful for surgeons, gynaecologists, radiologists, urologists, and orthopaedic surgeons.

Materials and Methods

The anatomical variations of the obturator veins were studied in 106 patients in which a thorough bilateral pelvic lymphadenectomy was performed from May 2014 to July 2015, in the First Clinic of Obstetrics and Gynecology, University of Medicine and Pharmacy Târgu-Mureș, by four surgeons. The oncological indications were cervical cancer in 84 patients, endometrial in ten, ovarian in 11 and primary vaginal in one. The main surgical procedures performed together with pelvic lymphadenectomy were open or laparoscopic radical hysterectomy +/- para-aortic lymphadenec- tomy in 82 patients, simple hysterectomy plus para-aortic lymphadenectomy in 16, pelvic exenterations in six, one total colp- ectomy and one abdominal radical trachelectomy.

Results

Symmetrical drainage on right and left sides was found only in 82 patients (70.7%): only in internal iliac vein - hence normal obturator vein - in 32 cases (30.1%) (Figure 1), both in external and internal iliac veins - hence normal obturator plus pubic vein- in 41 (38.6%) (Figure 2), and only in external iliac vein - hence only pubic vein- in

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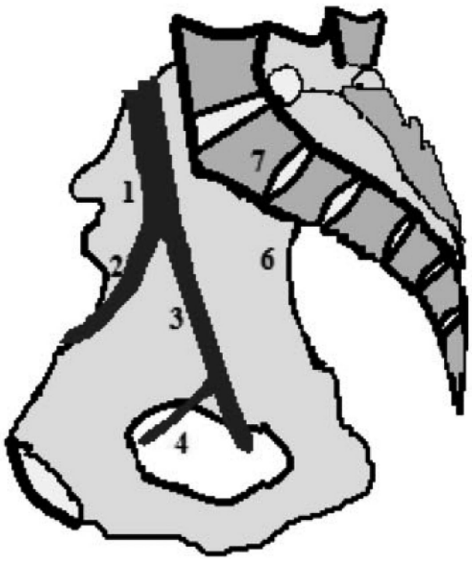

Figure 1. — A normal obturator vein draining directly into the internal iliac vein. Legend: 1) common iliac vein, 2) external iliac vein, 3) internal iliac vein, 4) obturator vein, 6) ilium, and 7) sacrum.

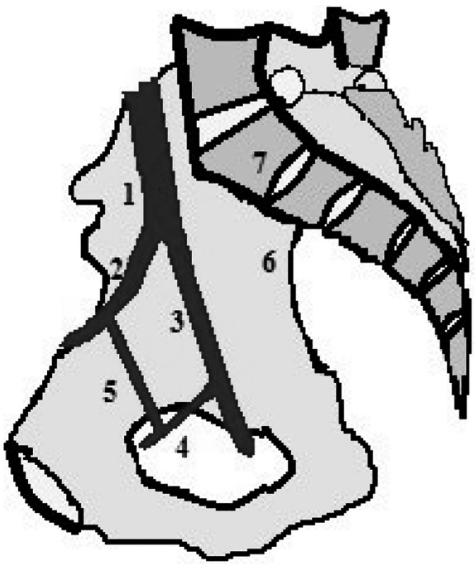

Figure 2. — A pubic vein replacing the normal obturator vein and draining directly into the external iliac vein. Legend: 1) common iliac vein, 2) external iliac vein, 3) internal iliac vein, 4) obturator vein, 5) pubic vein, 6) ilium, and 7) sacrum.

two patients (1.8%) (Figure 3). In 31 procedures (29.2%), an asymmetric drainage was found between the two sides: one side in internal iliac vein, the other side both in internal iliac vein and external iliac vein in 25 patients; in three patients, in external iliac vein on one side and in both internal iliac vein and external iliac vein on the other; and in external iliac vein on one side and in internal iliac vein on the other side in one case. In two patients, an agenesis of the internal iliac vein on one side with drainage directly in vena sacralis ima, and, respectively, in inferior vena cava were discovered. During two procedures, a duplication of the inferior vena cava was found. In two patients, there were two pubic veins found on one side.

The pubic vein, when present, may be very different in length or diameter. Sometimes it is very thin and, when compressed or pulled, is more difficult to be identified and can be easily injured. In other situations, its calibre is larger than the obturator vein itself. Also, the distance between the pubic vein and the inguinal ligament could be different, but the vein usually runs vertically close to the pubic bone. The calibre and location of the pubic veins may vary on the two sides of the pelvis.

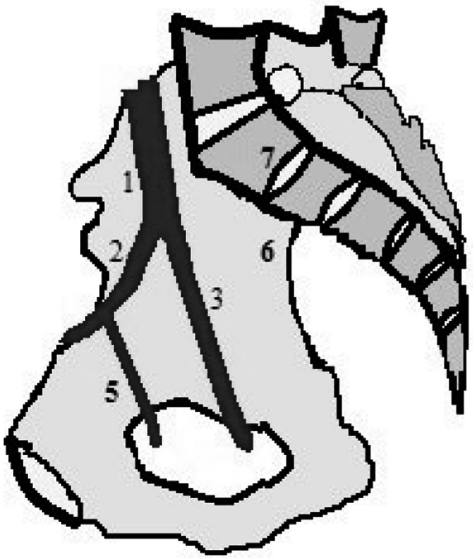

Figure 3. — An obturator vein draining directly into the internal iliac vein, and a branch arising from it drainage into the external iliac vein - the pubic vein. Legend: 1) common iliac vein, 2 External iliac vein, 3) internal iliac vein, 5) pubic vein, 6) ilium, and 7) sacrum.

Discussion

The obturator veins and their network are historically known as “corona mortis”, because, when injured, contribute to major bleeding complications during gynaecologic surgery. This venous network on the pelvic side wall and obturator fossa is not always very accessible for surgical haemostatis, especially in obese patients, and, as a consequence, haemorrhage may be sometimes difficult to control. Together with classical suture ligation, the vascular clips could be very useful. Electrocautery is recommended with caution because of the vicinity of sacral plexus branches or obturator nerve. In rare situations

when bleeding is difficult to be resolved, the obturator fossa may be packed with gauze.

Analyzing the dissections of 212 hemi-pelvises (106 patients), at least one pubic vein was found in 124 hemi-pelvises (58.4%) in the present study. The anatomists describe a higher incidence (83%) of anastomosis between the obturator and the external iliac or inferior epigastric arteries or veins after dissection of 40 cadavers (80 hemi-pelvises), but they took into account both venous and arterial anastomoses [3]. Of these, 60% had a large diameter (> three mm). Other anatomical studies on cadavers [4] reported venous anastomosis between obturator and external iliac systems in 22 out of 40 hemi-pelvises (55%).

During laparoscopic pelvic lymphadenectomy performed for gynecological malignancies, in 50 dissected hemi-pelvises, a venous anastomosis between the obturator and the external iliac systems was found in 46 % of hemi-pelvises, in general with high anatomic variability [5]. In another study [6], the existence of a venous anastomosis between the obturator and external iliac systems on the superior pubic ramus was a consistent finding in 96% of cases.

In the present study, in almost one-third of the patients (29.2%), an asymmetrical venous drainage was found between the two sides. So careful dissection must be performed on both pelvic sides, to avoid bleeding complications.

Conclusion

Pelvic surgeons and interventional radiologists must be aware of the frequent anatomical variations of the obturator veins.

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