Drive safely through the pelvis – know your pelvic roads
Retropubic space of Retzius
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This article is the first in the series of articles describing avascular spaces of the pelvis useful in gynaecological laparoscopic surgery. It will describe the relevant anatomy and the principles underlying surgical procedures which uses these spaces.

Almost all of the surgical procedures done by gynaecological surgeons are carried out within the pelvic cavity. Pelvis is a unique space packed with a large number of organs, vessels and nerves placed in close proximity to each other. These organs belong to different systems of the body. Conventional learning of a trainee is to study each of these organs separately related to the respective systems. Relationship between each of these entities and their position relative to each other (topographic anatomy) is usually not highlighted even in postgraduate training. However, it is of paramount importance for a gynaecological surgeon to know the topographical anatomy of the pelvis in order to achieve surgical excellence and to perform complex surgical procedures.

These pelvic spaces are potential spaces, which are opened up by careful dissection along anatomical planes. Creation of the pneumoperitoneum in laparoscopy significantly helps in this dissection by opening up these spaces. Dissection planes are well demarcated by the bubbles and arrows created by the gas. It shows the pelvic surgeon the roads to drive through. With proper dissection even the smallest blood vessels are visible and can be coagulated, making the surgery clean and almost bloodless, which contributes to an excellent surgical outcome. Also, all neurovascular bundles can be preserved thus preserving functionality of pelvic organs.

For descriptive and educational purposes the retroperitoneal spaces are divided into lateral and medial pelvic spaces. But in reality, all the spaces are continuous with each other. The arbitrary demarcations are by the fascial condensations, which carry nerves and blood vessels to the pelvic organs\textsuperscript{1}.

Figure 1 gives an overview of the anatomy of these spaces.

Table 1 describes the surgical procedures, which uses these spaces.
Figure 1. Schematic presentation of pelvic spaces and pelvic visceral ligaments. Upper view.

| Surgical procedures carried out in each retroperitoneal pelvic space | Surgical procedures carried out |
|---|---|
| **Medial spaces** |  |
| Retropubic | Burch colposuspension  
Paravaginal repair  
Bladder mobilization in ureteric re-implantation  
Mesh removals  |
| Vescicouterine | Mesh repair for cystocele  
Total laparoscopic hysterectomy  
Radical hysterectomy  
Vesicovaginal fistula repair  
Bladder endometriosis resection  
Vaginal cuff resection  
Sacrocolpopexy / Hysterocolpopexy  
Laparoscopic abdominal cerclage  
Scar ectopic excision  |
| Recto vaginal | Sacrocolpopexy  
Deep infiltrating endometriosis of rectosigmoid  
Vaginal endometriotic nodule dissection  
Bowel resection  |
| Retrorectal/ presacral | Bowel resection for deep infiltrating endometriosis  
Sacrocolpopexy  
Pre-sacral neurectomy  
Initiation of para-aortic lymphadenectomy  |
| **Lateral** |  |
| Paravaginal | Pelvic lymphadenectomy  |
| Paravesical | Radical hysterectomy  |
| Pararectal | Excision of ureteric endometriosis  
Ureteric reimplantation/ psoas hitch  
Bowel resection in DIE  
Excision of endometriosis involving sacral nerve roots  |
It is of paramount importance to understand the borders and how to open into these spaces safely to carry out the expected surgical procedure. This article will concentrate on the retropubic space (cave of Retzius) and its surgical landmarks.

Entry into the retropubic space is through the median umbilical ligament well above the bladder. This is facilitated by filling the bladder up to 300 ml with normal saline. Thereafter, the dissection is extended laterally up to the medial umbilical ligaments and inferiorly towards the pelvis. Whitish tissue of the ileopectineal ligament becomes visible at this point. This is called the ‘lighthouse’ of the retropubic space\(^2\). At this point, the bladder is deflated to avoid bladder injury. Further lateral dissection reveals the obturator neurovascular bundle. These vessels are seen roughly at a distance of 6 cm away from the mid-point of the pubic symphysis. This is the posterior limit of the space. 1 cm behind and above the vascular bundle the external iliac vessel and further above this the inguinal ligament is seen. Floor of the space is the arcus tendineous, ileococcygeus muscle and the paravaginal tissue. This dissection allows performing both the Burch colposuspension and paravaginal defect repair. Burch colposuspension is done using 0 non-absorbable sutures (Ethibond) on a curved 30 mm needle. Assistant elevates the vagina from below so that the connective tissue over the vagina can be cleared off revealing the whitish endopelvic fascia. The first suture is placed 2 cm away from mid urethra in the paravaginal tissue. The suture is anchored to the ipsilateral Coopers ligament. Special attention is made in placing the suture on the paravaginal tissue to prick parallel to the urethra. The second suture is placed at the urethro-vesical junction in a similar fashion 2 cm lateral to the bladder. Sutures on the other side are done in the same way. When tying the sutures, it is important not to exert excessive tension. In this regard, paravaginal tissue is elevated only up to the archus tendineous. The anatomical landmarks of the space with suture placement in illustrated in figure 2 and 3.

Paravaginal defects are seen clearly as a breach between the pubocervical fascia and the archus tendineous\(^3\). This can be further demonstrated by vaginal manipulation by the assistant. The motive of the repair is to identify the torn edges and to approximate them using non-absorbable sutures. First the apex of the tear at the paravaginal tissue near the top of the vagina is identified and this is anchored to the archus tendineous 1-2 cm anterior to the ischial spine using 2/0 non-absorbable (Ethibond) sutures. Series of sutures are used to close the gap in a similar fashion further moving anteriorly thus closing the identified defect.
Ureteric re-implantation is often needed when a segment of the ureter closest to the bladder is altered beyond salvation due to infiltration or compression by endometriotic deposits. When laparoscopic ureterolysis with stenting or ureteric shaving of endometriotic deposits have failed, the only option left is ureteric re-implantation after removal of the affected segment. Since this excision shortens the ureter during uretero-cysto-neoplasty (the anastomosis between the bladder and the ureter), the bladder needs to be mobilized caudally by dissecting into the retro-pubic space. Often, the bladder needs to be hitched to the Psoas (Psoas hitch) to prevent the bladder falling into its previous position, thus endangering the anastomosis. Rarely, even this mobilization is not adequate. In this instance a Boari flap must be created to compensate for the shortened ureter.

Surgeries using various meshes have fallen into disrepute in recent times. Various courts of law have granted compensations for the patients who underwent pelvic mesh repairs including patients who underwent vaginal tape placements for incontinence. The retro-pubic space will sometimes require dissections for the removal of these tapes.

Retropubic space is a narrow and a small potential space. It contains a number of venous vascular plexus and important vessels. Therefore, working in this space needs careful selection of needles and equipment, smooth handling and expertise in laparoscopic suturing. Knowing the paths will undoubtedly improve your ability for a safe journey through the retropubic space.

References
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