Original articles

The vascular and neuronal composition of the lateral ligament of the rectum and the rectosacral fascia

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Summary. Detailed dissections were performed on 83 pelvic halves from 45 cadavers in order to obtain more accurate data on the composition of the lateral ligament of the rectum and the rectosacral fascia. The middle rectal artery was observed in only 18 out of 81 specimens (22.2%). The lateral ligament of the rectum was divided into lateral and medial portions, according to the positional relationship to the pelvic plexus. The lateral part consisted of a superoanterior and an inferoposterior subdivision. The main component of the former was the middle rectal artery, while the pelvic splanchnic nerves were contained in the latter. Both components can be considered to contribute to the formation of the medial part, although the middle rectal vessels were not always present. The medial part consisted of the rectal branches from the pelvic plexus and their connective tissue. The rectosacral fascia was formed by dense connective tissue between the posterior wall of the rectum and the third and fourth sacral vertebrae. The main components of the fascia were branches of the lateral and median sacral vessels and the sacral splanchnic nerves which arose directly from the sacral sympathetic ganglia.

La structure du ligament latéral du rectum et du fascia recto sacré

Résumé. La dissection de 83 hémibassins provenant de 45 cadavres a été réalisée pour préciser la structure du ligament latéral du rectum et du fascia recto sacré. L’artère rectale moyenne (ARM) a été observée seulement sur 18 spécimens (22,2 %). Le ligament latéral du rectum a été divisé en portion latérale et médiale, en fonction des rapports topographiques avec le plexus pelvien. La partie latérale présente une portion antéro-supérieure contenant l’ARM et une portion postéro-inférieure contenant les nerfs splanchniques pelves (NSP). Ces deux composants (ARM et NSP) contribuent à la formation de la partie médiale bien que les vaisseaux rectaux moyens ne soient pas toujours présents. La partie médiale répond aux branches rectales du plexus pelvien et à leurs tissus conjonctifs environnants. Le fascia sacro-rectal est formé de tissu conjonctif dense, tendu de la paroi postérieure du rectum aux 3e et 4e vertèbres sacrées. Les principaux composants de ce fascia sont les branches latérales et médiales des vaisseaux sacrés et les nerfs splanchniques sacrés arrivant directement des ganglions sympathiques sacrés.

Key words : Lateral and posterior ligaments of the rectum — Middle rectal vessels — Pelvic splanchnic nerves — Rectosacral fascia — Macroscopic anatomy

Considerable importance has been attached to the lateral ligaments of the rectum in topographic anatomy of the pelvis [7]. They conduct lymphatics of the rectum [8, 9, 10] and also contribute to the support of the inferior part of the rectum. The chief component of each ligament is usually understood to be the vascular sheath which surrounds the middle rectal a. [5, 6]. However, according to our experience in the dissecting room, the middle rectal a. is not always present and the course it takes is variable. Consequently, it should not be regarded as a constant component of the
Table 1. Rate of occurrence of middle rectal artery

<table>
<thead>
<tr>
<th>Specimens examined</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cadavers</td>
<td>29</td>
<td>14</td>
<td>43</td>
</tr>
<tr>
<td>Number of pelvic-halves</td>
<td>54</td>
<td>4</td>
<td>81</td>
</tr>
<tr>
<td>Specimens with artery</td>
<td>11</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Number of cadavers</td>
<td>14</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Number of pelvic-halves</td>
<td>27</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td>37.9%</td>
<td>25.9%</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

The composition of the rectosacral fascia [3], which we will regard as the posterior ligament of the rectum, is not yet fully understood. For a more complete understanding of the composition of the lateral and posterior ligaments of the rectum, we closely examined a wide range of specimens.

Materials and method

The total material included 83 pelvic-halves from 45 cadavers for routine dissection, out of which 56 pelvic-halves from 31 cadavers were male and 27 from 14 were female. These were divided for dissection as follows; (1) for the composition of the lateral ligament, 81 pelvic-halves from 43 bodies (54 from 29 males and 27 from 14 females), (2) for the relationship between the pelvic plexus and the lateral ligament, 2 pelvic-halves from 2 males, and (3) for the composition of the rectosacral fascia, 36 pelvic-halves from 20 cadavers (24 from 13 males and 12 from 7 females).

The dissections were performed as follows:

1. After a transection of the cadaver at the level of the intervertebral disk between the second and third lumbar vertebrae, the pelvis was sectioned in the median sagittal plane, leaving the internal pelvic organs intact.

2. After the dissection of the lateral ligaments of the urogenital organs, the composition of the lateral ligament of the rectum was examined, with special reference to the relationship between the middle rectal vessels and the pelvic plexus. The point of entry into the rectal wall of the middle rectal artery was traced.

3. In order to find the rectosacral fascia, the rectosacral space was traced along the pelvic surface of the sacrum to the level of the third sacral vertebra downwards from the aortic bifurcation, as well as upwards from the lower end of the coccyx. The origin of the fascia from the sacrum was then examined, and its composition and relationship to the lateral ligament were carefully noted.

Results and discussion

Lateral ligament of the rectum

The lateral ligament of the rectum will be described under three headings; the middle rectal artery, the middle rectal vein, the pelvic plexus and their interrelationship. These are the three major components of the ligament.

Middle rectal artery. The middle rectal artery was found in 18 out of 81 pelvic-halves (22.2%), nine from each side, and in 15 out of 43 cadavers (34.9%) (Table 1). Bilateral arteries appeared in only three cadavers. The middle rectal artery occurred more frequently in males than in females (25.9% and 14.8%, respectively). In all of the 18 pelvic halves except one, a single middle rectal artery was found. In the one exceptional case there were two middle rectal arteries. Of these 19 arteries, 10 (52.6%) branched to the inferior part of the urinary bladder and prostate or vagina, while distribution of the remaining nine (47.4%) was limited to the rectum. Regarding the origin of the arteries, the most common point of origin was from the internal pudendal a., occurring 12 times in 12 halves. Four arteries arose from the inferior gluteal a. including the anomalous double case, while the other three from three halves had their origin from the internal iliac artery.

Some exact measurements of the middle rectal artery and the distance from neighbouring structures are given in detail in Table 2. All the measurements given are averages calculated from all the data collected.

The diameter of the artery at its origin was 1.6 mm. The origin was located 32.8 mm from the origin of the superior vesical artery, 19.9 mm from the upper border of the coccygeus muscle and 51.6 mm from the median part of the pelvic surface of the third sacral vertebra.

The course taken by the middle rectal artery was long and tortuous, running 80.4 mm. Of this length, 27.8 mm was before the pelvic plexus crossing, and 52.6 mm after.