骨盤内臓と骨盤壁・骨盤底を結ぶ結合組織構造

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骨盤内臓と骨盤壁・骨盤底を結ぶ結合組織構造の中には，婦人科における基靭帯のように，直腸側腔と膀胱側腔を展開するという手術操作によって初めて出現する一種の外科的 artifact も含まれている（Kato et al, 2002）．マクロ的に「確かに固い組織がある」とされる直腸外側靭帯等についても，局所解剖と組織学を組み合わせた研究はあまり行なわれていない上に，近年の術式の変化に応じて名称の指す部位が変化してきたように思われる．

私たちは，正常解剖体の脱灰済み骨盤標本（女性 5 体，男性 3 体）から厚さ 20 mm のマクロスライスを作成し，その断面を観察・記載した後で大型の組織学標本を作成するという手法を用い，骨盤内臓と骨盤

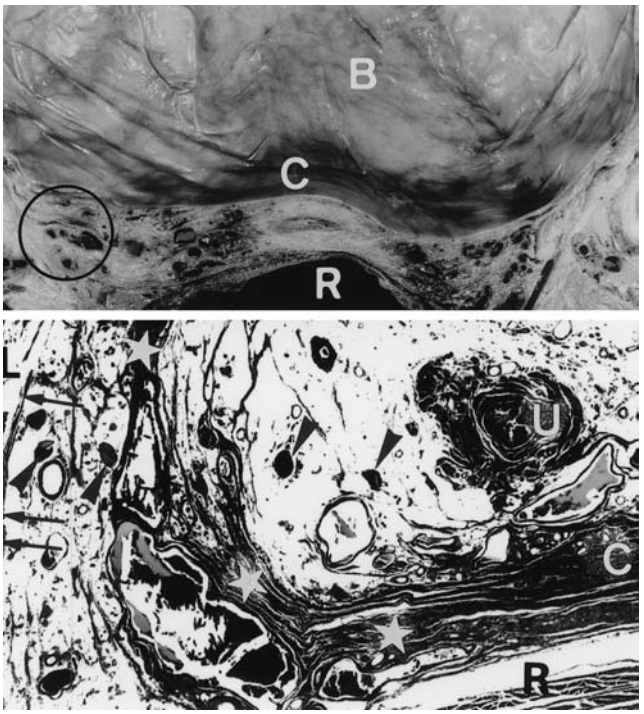

Fig. 1　Frontal section along the cervix uteri and its corresponding histology. A macroscopic slice including the cardinal ligament area. Arrows in the left-hand margin indicate the endopelvic fascia covering the upper surface of the levator ani (L). The rectum (R) is highly dilated due to feces. B, bladder; C, cervix uteri; U, ureter. The histology shows an area indicated by a circle in the macroscopic slice. Thick connective tissue bundle (white stars) originate from C and the covering fascia of R. It extends superolaterally toward the sacrospinous ligament. Nerve components are embedded in the connective tissue and 4 of them (arrowheads) contain ganglion cells.

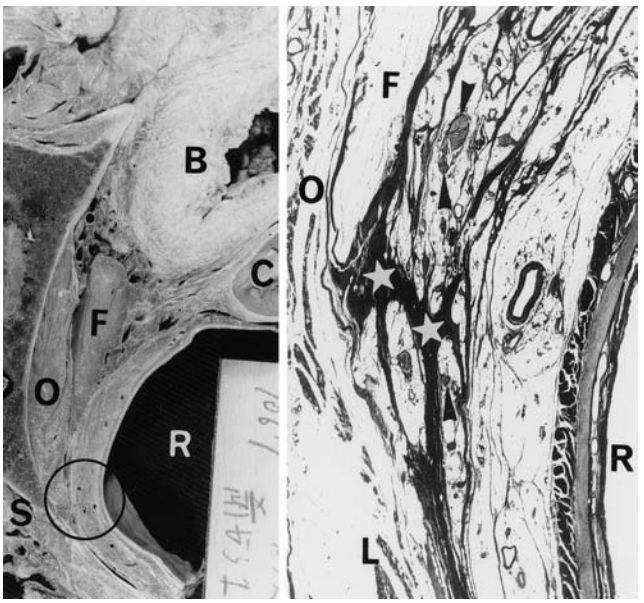

Fig. 2　Visceral fibrous tissues connect to the parietal endopelvic fascia at and around the ischial spine. This specimen is different from that of Fig. 1. A macroscopic frontal section including the ischial spine (S), obturator internus (O) and the cervix uteri (C). B, bladder; F, fatty tissue; R, rectum. The histology shows an area indicated by a circle in the macroscopic slice. Collagenous tissue bundles originate from B, C and the covering fascia of the R. They extend laterally and connect to the parietal fascia near S (white stars). Nerve components intermingled with the connective tissue fibers and 3 of them (arrowheads) contain ganglion cells. L. levator ani.

壁・骨盤底を結ぶ結合組織構造（以下，靭帯）および同靭帯内の神経分布を検討した．酸による脱灰操作のため免疫染色は使えず，切片にはHE染色ないしLFB髄鞘染色を施した．

靭帯が付着する部位は，内臓側では，子宮頸部，腟上部，前立腺と精嚢，そして直腸の中で子宮頸部（男性では前立腺）に近接した部位と尾骨に近接した部位である．骨盤底・骨盤壁側では，梨状筋内面の筋膜，尾骨筋内面の筋膜ないし仙棘靭帯，肛門挙筋内面の筋膜（泌尿器科のendopelvic fascia），そして尾骨と恥骨である．これら付着部については従来の記載と大差がないが，上下方向の立体的広がりは小さく，骨盤内臓から後外側に向けて左右の翼を広げたような平面的構築と見られた．また，靭帯は内腸骨血管周囲の結合組織（血管鞘）に接しながらも血管鞘から独立した構造として認識された．自律神経枝は，靭帯構造に埋没すると同時に靭帯の浅側深側いずれにも分布していた（Fig. 1, 2）．男性では下腹神経に沿って精嚢上方まで神経節細胞が散在しているのに対して，女性では子宮頸部より低位で骨盤内臓神経沿いだけに分布する傾向があった．仙骨子宮靭帯に対応すると言われる腹膜ヒダの深側には，下腹神経が走行していた．内臓どうしを引き離しながら観察するとマクロ的に靭帯と思われる部分でも，組織学上は疎な結合組織が占める部位もあったことから，マクロ解剖という手法自体が人為的に筋膜構造を作り出す危険性を感じた．

外科手技を語る時，「解剖学的な切離線」というような表現が好まれている．しかし，骨盤内臓と壁側構造を連絡する結合組織visceroparietal fascial bridge（Tamakawa et al, 2003）を神経からきれいに分離することは困難であると考えられた．そのようにできたとされる外科手技の多くは，一部の神経（例えば神経節細胞を含まない部分）に見切りをつけて，どこかで人為的に両者を分離しているのであろう．どこで見切りをつけるのか，ということがむしろ外科系医師の手腕というべきで，神経節細胞のように再生が期待できない構造を優先して温存するというようなコンセプトが必要だろう．

文　献

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Fascial structures and autonomic nerves in the female pelvis:
A study using macroscopic slices and their corresponding histology

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We investigated the topographical anatomy of the pelvic fasciae and autonomic nerves using macroscopic slices of decalcified pelves (5 females and 3 males). The lateral aspect of the supravaginal cervix uteri and superiormost vagina, or the seminal vesicle in males, issued abundant thick fiber bundles. These visceral fibrous tissues extended dorsolaterally, joined another fibrous tissue from the rectum (the actual lateral ligament of the rectum), and attached to the parietal fibrous tissues at and around the sciatic foramina, i.e., the sacrospinous ligament, thick fasciae of the coccygeus and piriformis and dorsal end of the covering fascia of the levator ani. Herein, we did not note the fibrous tissue connecting between the viscus and pubis. The inferior or ventral vagina, or the prostate in males, also issued thick but short fiber bundles communicating with the levator ani fascia. This connection between the viscus and levator fascia, when stretched, seemed to provide a macroscopic morphology called the arcus tendineus fasciae pelvis. The overall morphology of the visceroparietal fascial bridge exhibited a bilateral wing-like shape. The fascial bridge complex was adjacent to but dorso-inferior to the internal iliac vascular sheath and located slightly ventral to the pelvic splanchnic nerve. However, the pelvic plexus and its peripheral branches were embedded in the fascial complex. The hypogastric nerve ran along and beneath the uterosacral peritoneal fold, which did not contain thick fibrous tissue. Notably, in males, ganglion cells were distributed widely even upward along the hypogastric nerve. The male carvernous nerve ran through a smooth muscle-rich connective tissue between the levator ani and urethral rhabdosphincter.

During surgery, in combination with the superficially located vascular sheath, the morphology of the visceroparietal fascial bridge and associated nerves seemed to be artificially changed and developed into the so-called cardinal, uterosacral, uterovesical and/or rectal lateral ligaments. The classical concepts of these pelvic fascial structures, such as a mesentery-like, common neurovascular bundle in a famous atlas of Pernkopf, might be an oversimplification.

Key words: Cardinal ligament of uterus, Uterosacral ligament, Rectal lateral ligament, Pelvic splanchnic nerve, Hypogastric nerve