Re Native surgery and pelvic floor surgery

I write to comment on Andri Nieuwoudt's excellent editorial on vaginal surgery (Native Surgery and Pelvic Floor Surgery, Pelviperineology 2014: 33;99). I fully support his view that we need to look at the demands of pelvic surgery in a proper balanced way. In particular, to pay attention to correct planes, blood loss, and the anatomy of what we are seeking to repair. I begin with an anatomical perspective on the damaged tissues we all seek to repair.

Expressing a fully flexed large head of 9.4 to 9.5 cm through a normal pelvic inlet and outlet, the bony diameter being only 12-13 cm, is liable to stretch or tear the vagina and its supporting ligaments.

Even worse as regards tissue damage is a deflexed head which is 11.2 cm in diameter. There is not much room for the pelvic organs as the baby descends down the canal. It is inevitable that damage will occur in many patients, especially in this era of what we used to call "elderly primiparas", which now seems to be the norm. Certainly depolymerisation of the collagen occurs so collagen loses 95% of it strength.[1] At best, the tissues remain stretched and at worst, torn post-delivery. In his classic work, Yamada[2] examined the strength of the connective tissues of the body. He stated that ligaments had an estimated breaking strain approximately 300 mg/mm2, while the vagina had a much weaker breaking strength, 60 mg/mm2.

The pelvic ligaments suspend the organs from the bony pelvis. Organ support is not the function of the vagina. That is the role of ligaments. These act as joists to support the vaginal membrane which acts like a plaster board.

The vagina is essentially an elastic membrane with little inherent strength. Its role is to help the ligaments to support the organs and to transmit the muscle forces for urethral opening and closure. This stretching counteracts the hydrostatic pressure at the bladder base and so prevents displacement of the stretch receptors which initiate the micturition reflex. As the vagina is an organ, it cannot regenerate once it is excised. Surgical excision, stretching and tightening the vagina only serve to further weaken it further, potentially losing the elasticity required for symptom control.

The differential strengths, 300 mg/mm2 for the ligaments and 60 mg/mm2 for the vagina mandate a different approach for repair of each of these structures.

1. Vaginal elasticity should be preserved at all times (no excision). Any mesh applied to the vagina, even biological mesh will only stiffen it with potential loss of elasticity.
2. If the supporting ligament is excessively weak, it cannot be repaired, and needs to be reinforced by a tape. This stimulates the deposition of collagen which forms an artificial neoligament which work much like ceiling joists hold up the plasterboard (vaginal epithelium).
3. Surgery should be minimal. Large dissections should be avoided, as they have the potential to bleed and to cause organ damage.

There are only 5 ligamentous structures which support the vagina and uterus: pubourethral, ATFP, cardinal, uterosacral and perineal body.

We have found that reinforcing these 5 structures with thin strips of tape is sufficient to cure all pelvic organ prolapses, even of major degree. The same operations have been shown to achieve a high cure rate for bladder, bowel and chronic pelvic pain symptoms, even with minor degrees of prolapse.

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PETER PETROS

St. Vincent's Hospital Clinical School, Academic Department of Surgery, University of NSW, Sydney

E-mail: pp@kvinno.com

Correspondence on the cardinal ligament

Dear Editor,

In the clinical study by F. Wagenlehner, P. Petros, A. Gunnemann, P.A. Richardson, Y. Sekiguchi (Cardinal ligament: a live anatomical study, Pelviperineolofy 2013; 32: 72-75), the Authors defined the cardinal ligaments insert not only on the lateral part of the cervix but also in its anterior part. From the anatomical point of view, the function of sustain of the pelvic viscera is ascribed to the retroperitoneal connective tissue and is based on the description of connective condensations forming visceral fascias (rectal, cervicovaginal and vesical fascia, respectively) and ligaments. According to some authors the so-called visceral pelvic fascia (endopelvic fascia) would include a fibrous connective system that forms 2 paired ligaments:[1-3] the sacropubic laminae and the cardinal ligaments of Mackenrodt. In particular, the *cardinal ligaments of Mackenrodt* run transverse from the pelvic wall to the uterine cervix.

Others have studied the histological structure of the retroperitoneal connective tissue in various regions of the female pelvis, including the base of the broad ligament, sacrouterine ligaments and so forth, and showed the absence of true ligamentous structures (although not all abandoned the theory of the existence of well defined structures with supporting function).[4-8] There is no doubt that these disagreements depend on the tendency to mix observations made in the cadaver with those in the living subject, as well as those found in normal with those derived from pathologically altered structures. In addition, postmortem tissue alterations, artifacts of preparation and absence of muscular tone may deeply modify the true anatomical organization of the retroperitoneal connective tissue. De Caro et al.[8-9] reported that in the female pelvis ligaments or bundles do not exist as morphologically defined fibrous structures but only as areolar connective tissue. In particular, the cardinal ligaments correspond respectively to the uterine vessels, around which there is areolar adipose tissue with smooth muscle cells. In particular, after removing the lipid component from the adipose lobules, the retroperitoneal connective tissue consists of thin connective laminae forming a 3-dimensional mesh linked to the connective sheaths of the neurovascular bundles and parietal pelvic fascia.[8] The 3-D mesh, that constitutes the retroperitoneal connective tissue at rest, assumes the appearance of a strong cable when it is placed under tension (for instance, traction on the cervix or paracervical tissues), which may explain the apparent ligaments visible during surgery. In this perspective, the spatial organization of the retroperitoneal connective tissue constitutes an anatomical device, which, passing the functional limits of any individual ligament, has elastic supporting properties. These properties may be compromised by modifications of the connective or adipose components of the retroperitoneal connective tissue (during menopause), which might explain the cause of pelvic viscera prolapse due to reduction of supporting properties.[10-11]

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RAFFAELE DE CARO

Institute of Human Anatomy, Department of Molecular Medicine, University of Padova, Italy

rdecaro@unipd.it

Dear Editor,

The clinical study by F. Wagenlehner et Al (Cardinal ligament: a live anatomical study, Pelviperineolofy 2013; 32:72-75), is definitely a very interesting one, looking with a fresh and significantly different eye on the important issue of the cardinal ligament. The cardinal ligament is obviously a substantial component of the pelvic floor supportive architecture, together with the sacro-cervical and the cervico-pubic ones. Understanding of the accurate anatomical , and – even more- the functional properties of the cardinal ligaments is therefore of much value. Until lately was our knowledge based on rather “ancient” anatomical descriptions, derived from cadaveric studies. This is biased by the tissue post mortem and fixation changes, that avoids the possibility to evaluate properly the influence of the cardinal ligaments on neighboring viscera, as the bladder. Evaluating the cardinal ligaments anatomy and function on living patients, is a new and probably better way to explore this field, and comparing patients with broken and healthy ligaments is definitely advocated. Understanding that the cardinal ligaments are inserted not only to the uterine cervix but also to the bladder sheds new light on our perception of the centro-apical compartment of the pelvic floor and on the ways we might elect to take for adequate surgical reconstruction.

MENAHEM NEUMAN

Urogynecology, Ob-Gyn, Western Galilee Hospital, Nahariya, Israel

mneuman@netvision.net.il

ERRATA CORRIGE

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Klaus Goeschen. Role of uterosacral ligaments in the causation and cure of chronic pelvic pain syndrome. The picture 19a has its legend in Fig 19c and picture 19c is described in Fig 19a. The text in the journal online is correct.