UroNews Submission

Dr. Ross Calopedos, along with co-authors A/Prof Prem Rashid and Ming Zhang, were awarded a research prize by the Sexual Medicine Society of North America (SMSNA) for their work presented at a recent conference in San Diego. While the $1000 USD reward is unlikely to cover Ross' travel costs, it remains a notable contribution to the existing understanding of penile suspensory ligament (PSL) anatomy.

This is an often-overlooked area that features more frequently in plastic surgery literature. Here, a 3-component theory is promulgated and serves as anatomical justification for penile lengthening operations. Proponents ensure that the fundiform and suspensory ligaments can be safely divided without functional compromise, because the deeper arcuate ligament is the main support structure and is preserved.

Elsewhere in the literature, there are case series of men with severe sexual dysfunction from PSL deficiency. Despite normal erections, it is impossible for these men to maintain penetration without "slipping out" and re-establishing connection requires significant manual assistance. This is a likely under-reported population of men that slip between the scope of subspecialist care. Nonetheless, it is an issue that has bounced into our proverbial court.

A novel technology that combines epoxy-sheet plastination with confocal-laser microscopy was used to bridge this apparent disconnect. This technique differs from traditional dissection that distorts anatomy, or the small field of view offered by histological examination. Plastination allows preservation of in-situ architecture and endogenous autofluorescence of collagen/elastin/myofilaments when excited using 488nm-confocal-laser microscope. Thus, connective tissue can be traced across broad anatomical areas using montaged slices (Figure 1). Data from six male cadavers were used in the present study.

Through their findings, the authors propose a new classification system for the PSL that corresponds to distinct histoarchitectural origins of its different components: *Prepubic, Subpubic, Retropubic* (Table 1, Figure 2). Fibres in the prepubic region all have a musculotendinous origin from the abdominal wall musculature and its investing fascia. This same origin also contributes to Scarpa's fascia, hence the confusion even in most reputable textbooks (Figure 3). The subpubic component was made up of ligamentous fibres (from bone or cartilage) only and inserted directly into the tunica albuginea. Interestingly, a non-dominant portion of these fibres ran perpendicular to the others. Whilst connective tissue decussation has been observed elsewhere in the body where structures are intended to be fixed in place, here this description is a first in medical literature. These findings demonstrate that the subpubic ligaments, divided in cosmetic efforts, are the main penile support structure (Figure 4). Contrary to popular belief, the professed arcuate ligament has no role in phallic support. In another first, the authors identify fibres of the retropubic PSL instead. These were musculotendinous in origin and extended anteriorly from the investing fascia of the urogenital diaphragm. They inserted into and likely contribute to the tunica albuginea (Figure 5).

This anatomical rationale for achieving a stable, functional, and slightly longer penis is completely unfounded. The biomechanical outcome for the erect penis is not dissimilar to an iatrogenic ACL injury of the knee. Unsurprisingly, you can't "have it all" by simply snipping some suspensory tissue. Greater urological ownership in this space will hopefully ensure that penile dysmorphophobic patients are appropriately counselled, rather than capitalised on. Further studies are required to validate this classification, but use of this technology will undoubtedly lead to new anatomical insights that will be invaluable to the advancement of urological care.

Figure 1: Example of macroscopic sagittal slice (A) and confocal microscopy of area within box demonstrating connective tissue autofluorescence (B)

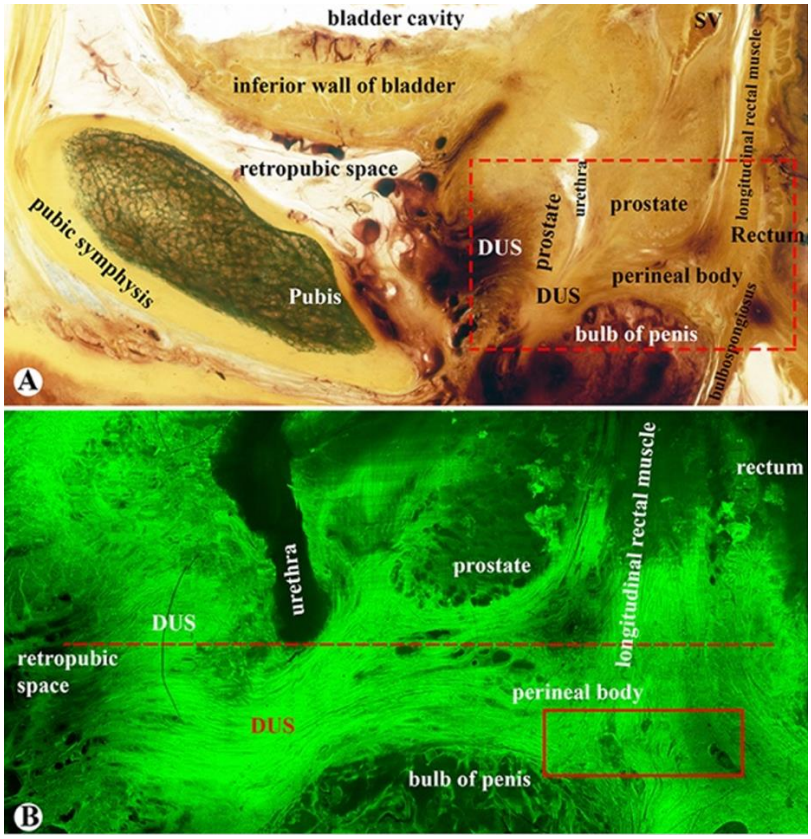

Table 1: Summary of Findings

PSL Component	Origin	Insertion	Fibrous Orientation
Prepubic	***Musculotendinous:*** Aponeurotic fibres of abdominal wall musculature. These fibres also contribute to Scarpa's fascia. As such, FL is not a thickening nor a continuation of Scarpa's fascia.	Superficial penile fascia (Dartos)	Superior to Inferior
Subpubic	***Ligamentous:*** Fibres originate directly from pubic bone or symphyseal cartilage	Tunica albuginea	***Fibres decussate:*** Anterosuperior to Posteroinferior *(dominant portion)*. Posterosuperior to Anteroinferior *(non-dominant portion)*
Retropubic	***Musculotendinous:*** Fibres originate from the investing fascia of the urogenital diaphragm	Tunica albuginea	Posterior to Anterior

Figure 2: Proposed Nomenclature for PSL Anatomy

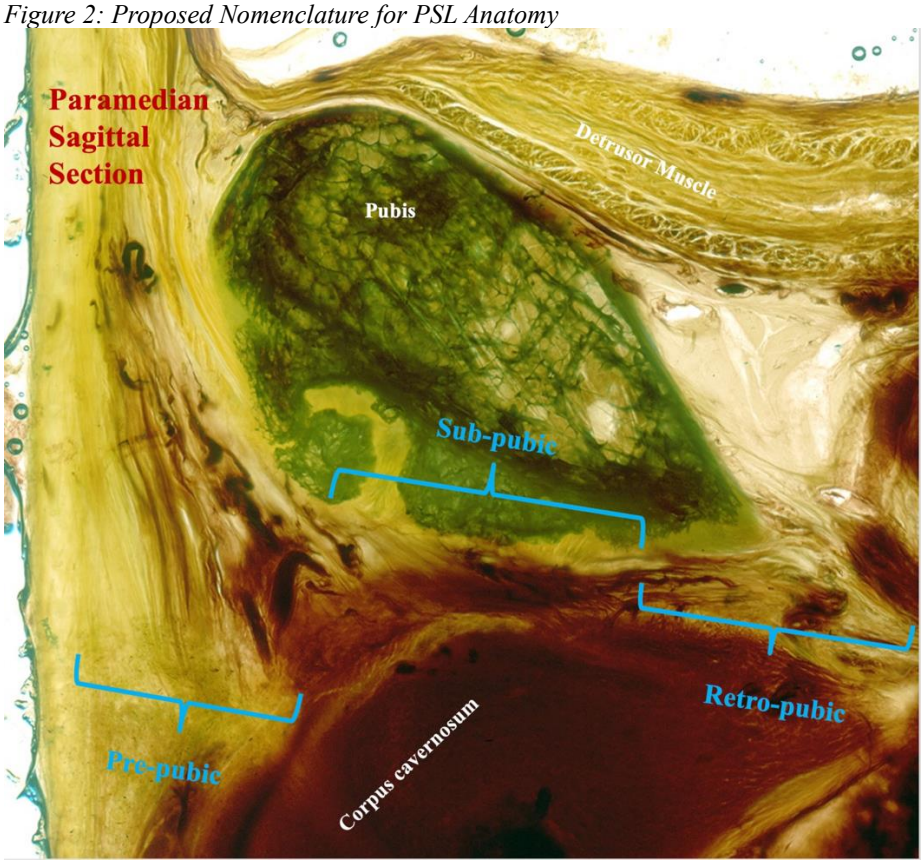

Figure 3: Prepubic PSL

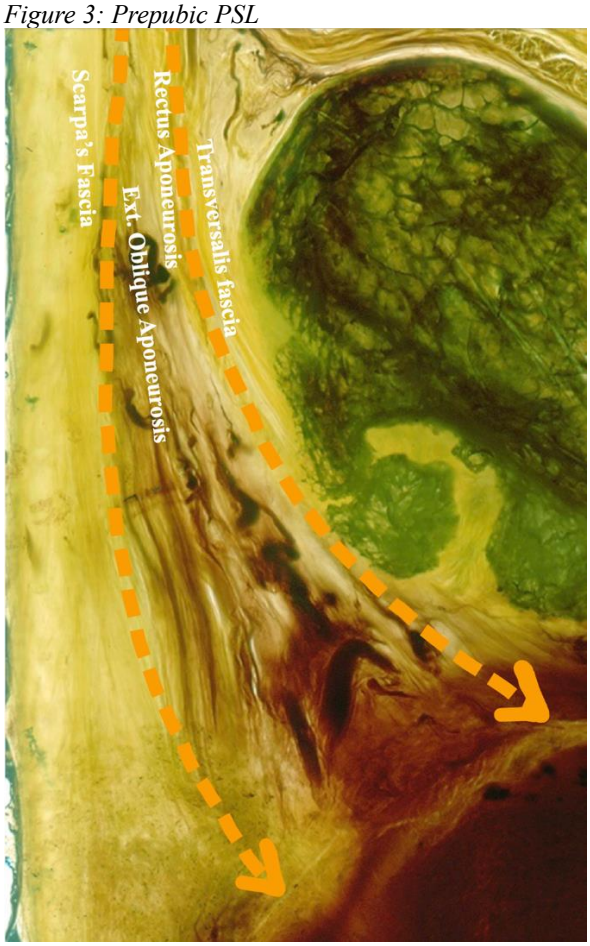

Figure 4: Subpubic PSL

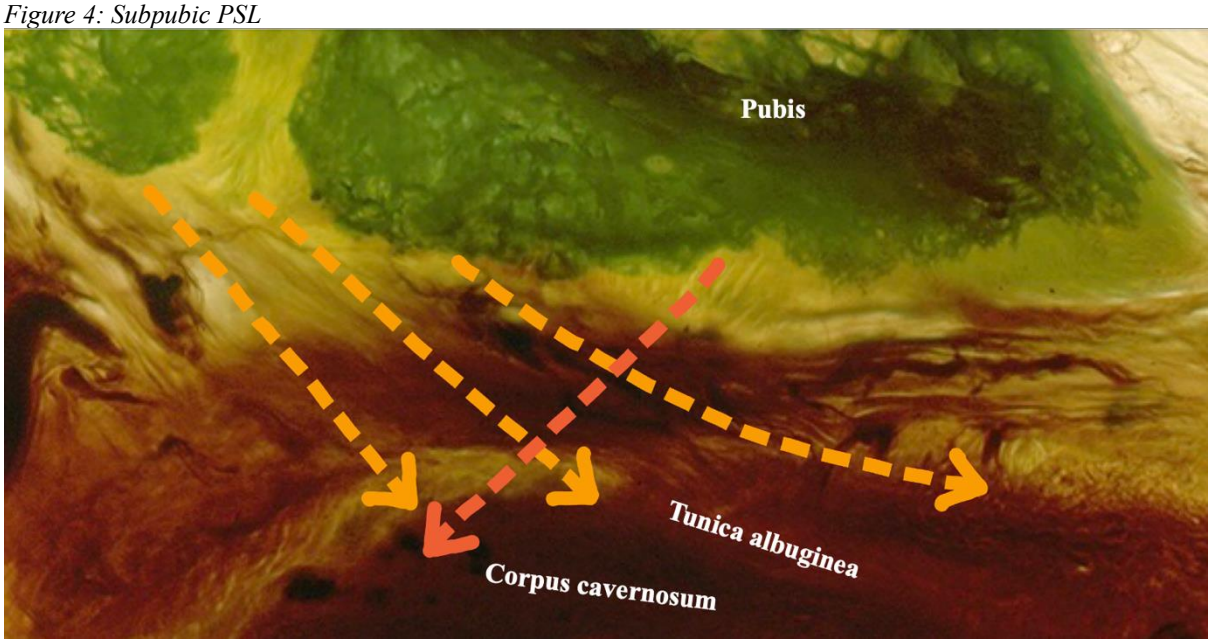

Figure 5: Retropubic PSL