

## The Pars Intermedia: An Anatomic Basis for a Coordinated Vascular Response to Female Genital Arousal

Cheryl Shih, MD,\* Christopher J. Cold, MD,† and Claire C. Yang, MD\*

\*Department of Urology, University of Washington School of Medicine, Seattle, WA, USA; †Department of Pathology, Marshfield Clinic, Marshfield, WI, USA

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### ABSTRACT

**Introduction.** The pars intermedia is an area of the vulva that has been inconsistently described in the literature.

**Aim.** We conducted anatomic studies to better describe the tissues and vascular structures of the pars intermedia and proposed a functional rationale of the pars intermedia in the female sexual response.

**Methods.** Nine cadaveric vulvectomy specimens were used. Each was serially sectioned and stained with hematoxylin and eosin and Masson's trichrome.

**Main Outcome Measures.** Histologic ultrastructural description of the pars intermedia.

**Results.** The pars intermedia contains veins traveling longitudinally in the angle of the clitoris, supported by collagen-rich stromal tissues. These veins drain the different vascular compartments of the vulva, including the clitoris, the bulbs, and labia minora; also, the interconnecting veins link the different vascular compartments. The pars intermedia is not composed of erectile tissue, distinguishing it from the erectile tissues of the corpora cavernosa of the clitoris as well as the corpus spongiosum of the clitoral (vestibular) bulbs.

**Conclusions.** The venous communications of the pars intermedia, linking the erectile tissues with the other vascular compartments of the vulva, appear to provide the anatomic basis for a coordinated vascular response during female sexual arousal. **Shih C, Cold CJ, and Yang CC. The pars intermedia: An anatomic basis for a coordinated vascular response to female genital arousal. J Sex Med 2013;10:1526–1530.**

**Key Words.** Female Genital Anatomy; Vulva; Pars Intermedia; Clitoris; Corpus Cavernosum

### Introduction

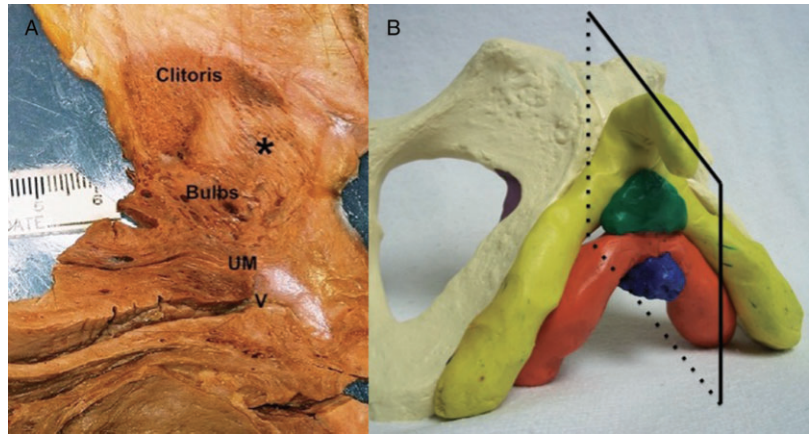
In previous dissections of the female external genitalia, we encountered the entity known as the pars intermedia. This is an area immediately beneath the midline vulvar skin, between the clitoral body and the commissure of the clitoral (vestibular) bulbs. Some authors refer to the pars intermedia as the continuation of the erectile tissue of the corpus spongiosum in the midline, above the vestibule of the vagina, joining the bilateral clitoral bulbs [1]. Others do not identify the pars intermedia as erectile tissue but as the venous plexus of Kobelt that lies in the angle of the clitoris

and connects the clitoral bulbs and corpora cavernosa [2]. In either case, it is unclear what role the pars intermedia might play in the female sexual response given its proximity to the sexually responsive tissues of the vulva. We therefore conducted more detailed studies of the pars intermedia so that the anatomical findings could better inform our understanding of the role of this structure in the female sexual response.

### Materials and Methods

Nine cadaveric female vulvectomy specimens were available for this study. The study was deemed

**Figure 1** (A) Gross sagittal section through the midline urethral meatus (UM) and vaginal introitus (V). Top of the picture is anterior, right of the picture is the perineal surface. The erectile tissue of the clitoris and clitoral bulbs appear dark red-brown and spongy. The asterisk (\*) marks the region of the pars intermedia. Marker in centimeters. (B) Clay model (not to scale) of the clitoris (yellow), clitoral bulbs (red), urethra (blue), and pars intermedia (green) in the context of the pelvic bones. The plane indicates a midline sagittal section.



exempt from institutional review board oversight. The ages of the cadavers were unknown, although they appeared to be from postmenopausal women. Tissue samples were embalmed in 40% ethanol and 20% glycerin. They were transferred after sectioning to neutral buffered formalin for processing (formalin-fixed paraffin-embedded tissue blocks).

All vulvectomy specimens were serially sectioned and submitted in separate cassette blocks. Sections were taken from the clitoral glands and corpora cavernosa, the anterior vestibule and clitoral bulbs, the labia minora, and the labia majora. Serial sections were then stained with hematoxylin and eosin to examine general histologic features. Selected blocks were stained with Masson's trichrome.

## Results

### *Vascular Compartments of the External Female Genitalia*

We have previously described the vascular compartments of the external female genitalia, which include the erectile tissue of the corpora cavernosa of the clitoris and the clitoral bulbs as well as the nonerectile specialized genital vascular tissue of the labia minora and vestibule of the vagina [3]. For the purpose of anatomic orientation and to frame the subsequent description of the pars intermedia, we briefly summarize the vascular compartments here.

The clitoris is a wishbone-shaped structure located beneath the vulvar skin, superficial to the inferior pubic rami. The clitoral body is composed of the erectile tissue of the paired corpora cavernosa. Immediately inferior to the convergence of the paired corpora cavernosa lies the commissure

of the clitoral bulbs. The clitoral bulbs are two globular, teardrop-shaped structures connected by a commissure and draped over the urethra similar to a saddlebag. The bulbs are composed of the erectile tissue of the corpus spongiosum. Histologically, erectile tissue is characterized by prominent vascular spaces interspersed by trabeculae of smooth muscle and collagen-rich fibrous tissue.

In addition to erectile tissue, there are nonerectile specialized genital vascular tissues, characterized by the abundance of vessels interspersed within fibrous stroma that lacks smooth muscle fibers. These include the tissues of the labia minora, periurethra, vestibule/vagina, and glands clitoris.

### **Pars Intermedia**

In the intervening region between the corpora cavernosa and the corpora spongiosum of the clitoral bulbs lies the pars intermedia (Figure 1). Grossly, the pars intermedia is composed of tissue with large vascular spaces filled with blood. In at least one cadaveric specimen, the gross appearance of the pars intermedia was indistinguishable from the spongy tissue of the corpora cavernosa and clitoral bulbs. However, in most of the cadavers, the vascular spaces of the pars intermedia appeared larger and more vacuous compared with that of the erectile tissues (Figure 2). The area does not have clear anatomic boundaries.

Histologically, the pars intermedia is very different from the erectile tissues of the clitoris and the clitoral bulbs. Instead of prominent vascular spaces interspersed by thin fibromuscular trabeculae as seen in erectile tissue, the pars intermedia is composed of predominantly collagen-rich stroma supporting the veins of Kobelt's plexus, which correspond to the large vascular spaces noted on gross examination (Figure 3). Veins from Kobelt's

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