Where is the sphincter? Pelvic Surgical Anatomy and Imaging.

W3, 15 October 2012 09:00 - 10:30

Start	End	Topic	Speakers
09:00	09:30	Introduction and Urologists view of Pelvis	• Liaqat Chowoo
09:30	09:45	Radiologists view of Pelvis	• Sadashiv Kamath
09:45	10:00	Gynecologists view of Pelvis	• Sophia Yue
10:00	10:15	Colorectal Surgeons View of Pelvis	• Liaqat Chowoo
10:15	10:30	Q&A and open discussion	All

Aims of course/workshop

This 90 minute workshop is aimed at reinforcing the three dimensional pure and applied anatomy of the urinary sphincter and pelvic floor. Clinical management of incontinence will be correlated. We present a multidisciplinary approach involving a urologist, gynaecologist, colorectal surgeon and a radiologist's view of pelvis. We introduce multidimensional models to facilitate the understanding of the anatomical basis of pelvic floor reconstruction. Cross-sectional Radiology and functional anatomy will be tied in to the endoscopic and laparoscopic approach for each discipline with special reference to incontinence surgery. This will take the form of a capsule of brief didactic lectures, multimedia presentations, case discussions, & questions.

Educational Objectives

Description of the Urinary Sphincter mechanism in the literature is inadequate. To facilitate the understanding of this complex anatomical structure we propose an innovative alternative to traditional anatomical teaching. Laparoscopic/robotic views of the sphincter will be combined with open pelvic, cystoscopic, hysterscopic and rectoscopic views using state of the art imaging technology. Blending this image cohort with cross-sectional images of the region will enable the learner to register a unique impression of the Sphincter mechanism. This should instil extra confidence in approaching the sphincter, surgically or otherwise. Importance of physiotherapy, urethral bulking, suspensions, tapes and artificial Sphincters will be woven into context. Our new capsule has potential as a teaching tool and has room for improvement to optimize its effectiveness. The interactive format will improve perceived educational value and enhance confidence. It may help to standardize the profiling of surgical training.

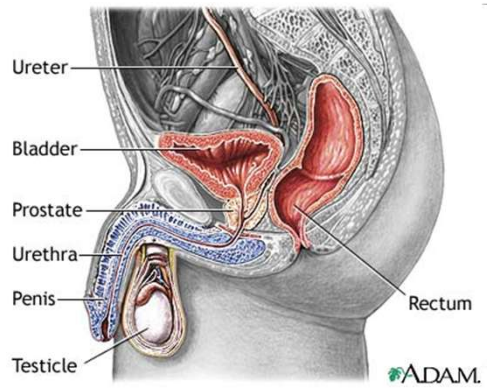
Where is the Sphincter????

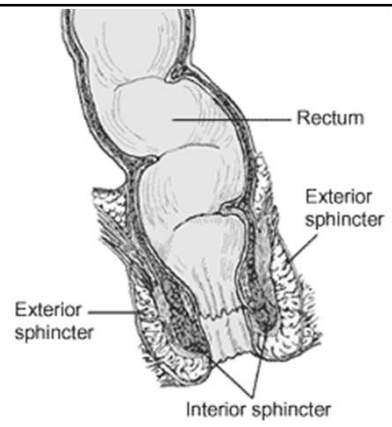
Multimodal Pelvic Anatomy

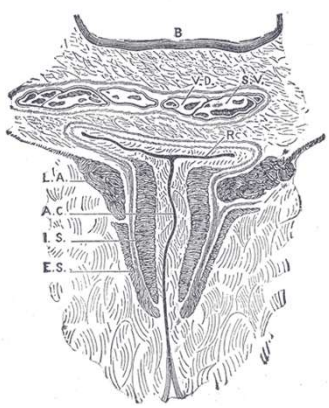
Chowoo/Kamath/Farara/

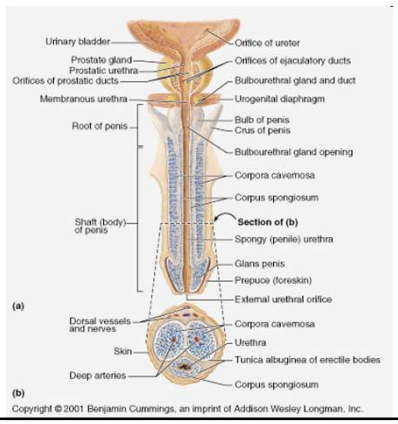
Obturator internus and arcus tendineus

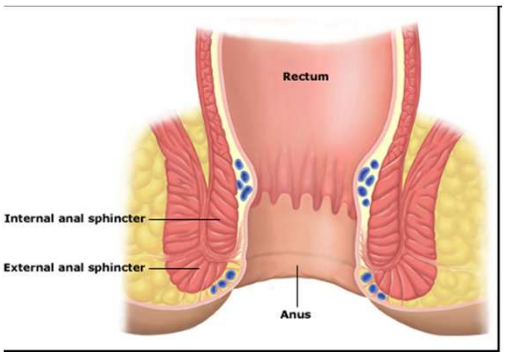
- Obturator internus muscle
  - inner part of the pelvic sidewall through lesser sciatic foramen to femur
- Tendinous arc
  - tense fibrous band on obturator internus muscle extending between pubis and ischial spine
  - lateral attachments of pelvic floor muscles and ligaments

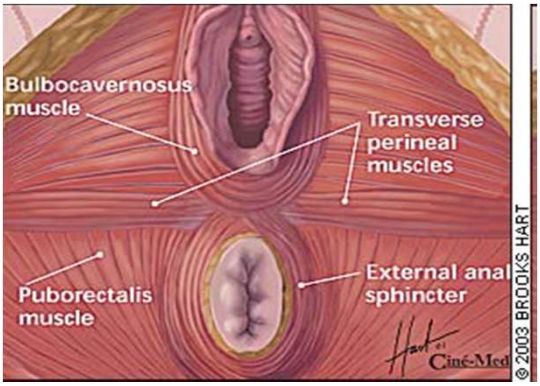


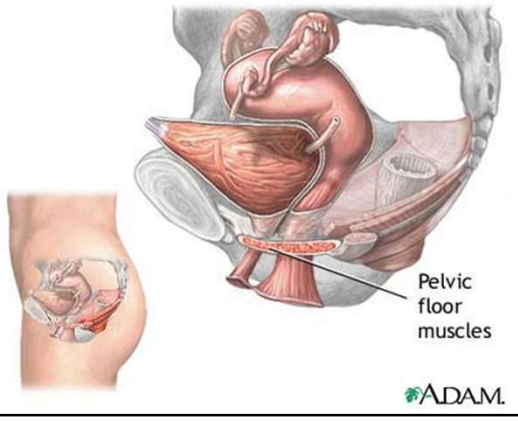


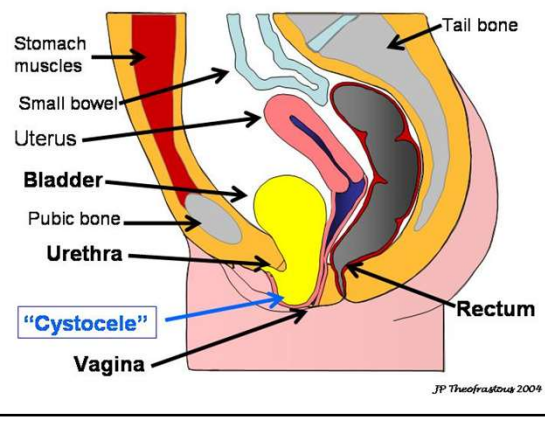


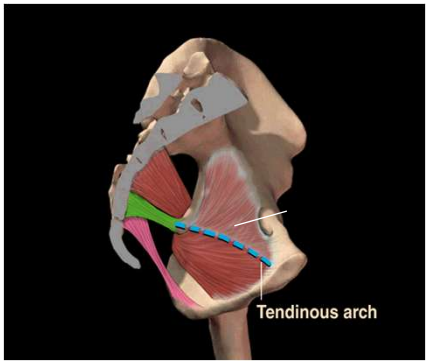




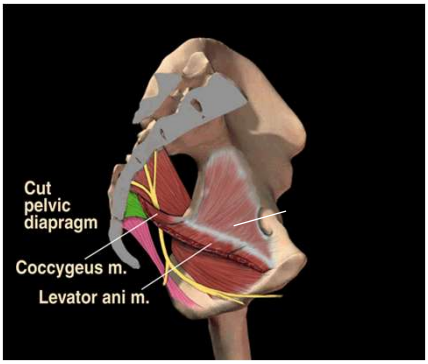








muscle



muscle

Muscular supports

- Pelvic diaphragm
- Urogenital diaphragm (perineal membrane)
- Perineal body

Herschorn and Carr, Campbell's Urology 8th edition, 2002

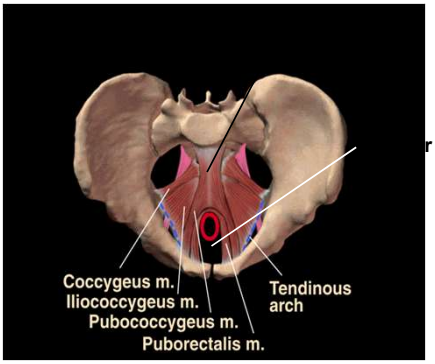
Pelvic Diaphragm

- Closes the pelvic outlet
- Major support of the urethra, vagina, rectum
- Composed of levator ani and coccygeus
  - Levator ani composed of pubococcygeus medially and iliococcygeus laterally
    - Subdivision of pubococcygeus are pubourethralis, pubovaginalis, puboanalis, puborectalis
    - From pubis and tendinous arc, and to coccyx
  - Coccygeus from ischial spine to coccyx and sacrum (sits on sacrospinous ligament)

Levator ani

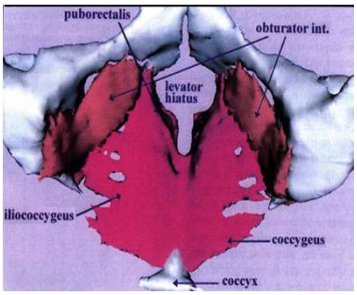
- Inner part forms margin of the urogenital (levator) hiatus
- Fibres to urethra, vagina, and rectum
- At level of external urethral sphincter
- Posterior part
  - Levator plate
    - Horizontal in the standing position
    - From rectum to coccyx
    - Supports upper 2/3 vagina and rectum

Herschorn and Carr, Campbell's Urology 8th edition, 2002



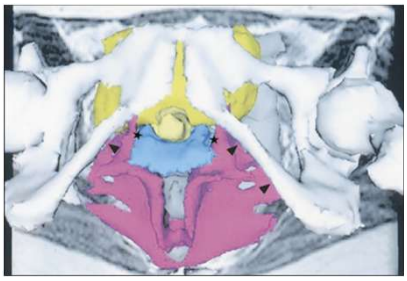
r hiatus

3-D MR Scan of Pelvic Diaphragm

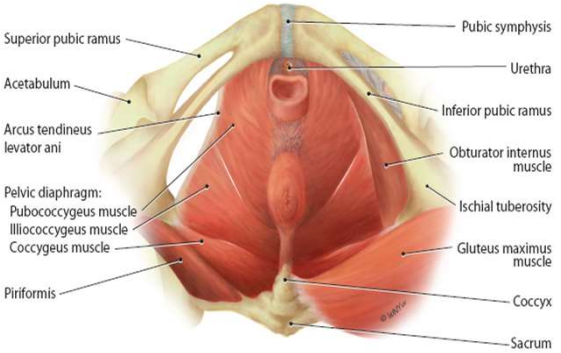


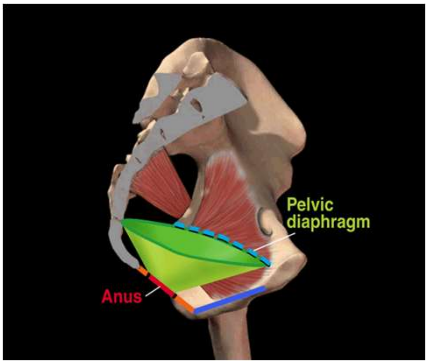
Fielding et al. AJR 2000; 174:657

3-D MR Scan of Pelvic Diaphragm



Fielding et al. AJR 2000; 174:657





Perineal Membrane
(Urogenital Diaphragm)

- Anterior pelvic support where levators are deficient
- Controversy as to exact structure
- Bridges gap between inferior pubic rami bilaterally and perineal body
- Closes genital hiatus, supports and has a sphincter like effect on the distal vagina
- Contributes to continence because it is attached to periurethral striated muscles
- Structural support for the distal urethra

Conclusions

- Anatomy is key to understanding pathophysiology of incontinence and prolapse
- Frequently related problems
- Treatment largely determined by history and physical findings

Key points

- The levator ani and coccygeus form the pelvic diaphragm.
- The pubococcygeus and iliococcygeus, from medial to lateral, are the 2 muscle groups of the levator ani.
- The levator plate, formed by the fusion of the levator muscles posteriorly, supports the rectum and upper 2/3 of the vagina.
- The arcus tendineus levator ani and the arcus tendineus fasciae pelvis are the white fascial bands extending from the ischial spine to the pubis and are the lateral supports of the pelvic structures.
- Anterior wall defects can be central, lateral, or combined
- The anatomic classification of pelvic organ prolapse is based on the part of the vaginal wall that is protruding.

- Select

Sunday, May 15, 2011 10:30 AM-12:30 PM
Bladder and Urethra: Anatomy, Physiology and Pharmacology
Moderated Poster
Source of Funding: None.
221: THE RHABDOSPHINCTER IS A HIGHLY SPECIALIZED MUSCLE
Hannes Strasser
Innsbruck, Austria
INTRODUCTION AND OBJECTIVES: The exact characterization of the fiber types as well as the functional properties of the rhabdosphincter have been a subject of controversy so far. However, it is generally accepted that contractions of the rhabdosphincter play a prominent part in actively maintaining continence. In the present study the physiologic properties of the rhabdosphincter were investigated. METHODS: Histological arrangement as well as morphology of the striated muscle fibers of the rhabdosphincter were investigated in 23 specimens by means of haematoxylin-eosin-staining. In addition, tiny fresh biopsies of the rhabdosphincter were obtained from 18 male and female patients undergoing radical prostatectomy or cystectomy. Tissue samples were rapidly frozen, then prepared with a cryostat and finally processed for routine histology and histochemical fiber typing (acid and alkaline myosin ATP-ase, succinate dehydrogenase, NADH-dehydrogenase, phosphorylase).

RESULTS:
The striated muscle fibers of the rhabdosphincter enclose the urethra ventrally and laterally. Dorsally, a strong connective tissue raphe anchors the rhabdosphincter either in the ventral vaginal wall (women) or in the perineal body (men). The rhabdosphincter is composed of uniform, small and densely packed striated muscle cells. Cryostat sections of rhabdosphincter tissue processed for myosin ATP-ase demonstrated a homogenous population of small diameter, type I (slow twitch) fibers arranged as an omega-shaped collar around the urethra. Following acid pre-incubation each muscle fiber was rich in enzyme reaction product, while on sections that were processed using alkaline pre-incubation the same fibers appeared pale-staining. Furthermore, the fibers possessed a high content of succinate dehydrogenase. That these fibers almost exclusively corresponded to those of the slow-twitch type could finally be confirmed by the demonstration of the high content of NADH-dehydrogenase and the low content of phosphorylase.

CONCLUSIONS:
The present study shows that the rhabdosphincter consists of highly specialized muscle fibers that are functionally capable of maintaining tone over prolonged time periods without fatigue. The striated fibers of the rhabdosphincter are rich in enzymes contained by muscle fibers functionally classified as slow twitch (type I) fibers. Therefore, the muscle fibers are ideally suited for tonic closure of the urethra.

ANATOMY OF THE PELVIS

DR SADASHIV H KAMATH

DEPARTMENT OF RADIOLOGY
NLG NHS TRUST

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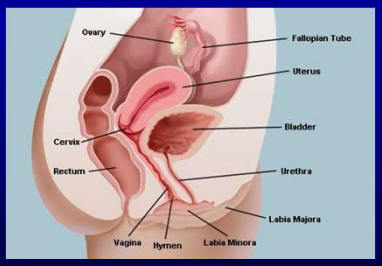

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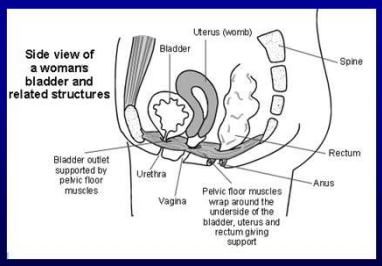

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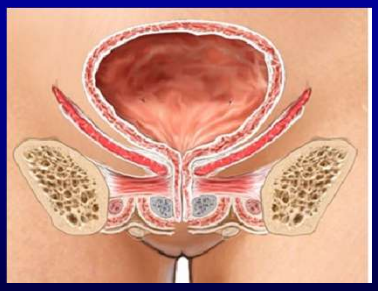

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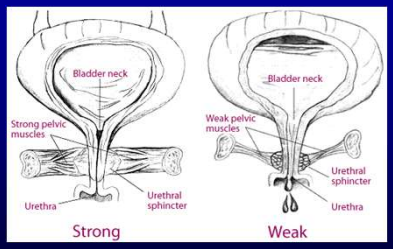

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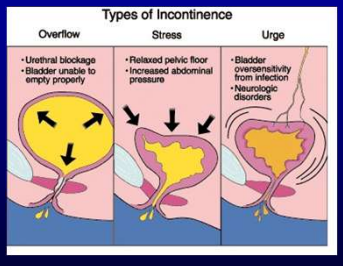

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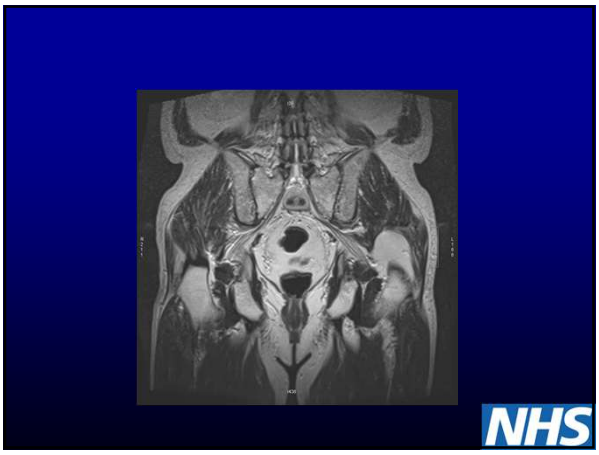
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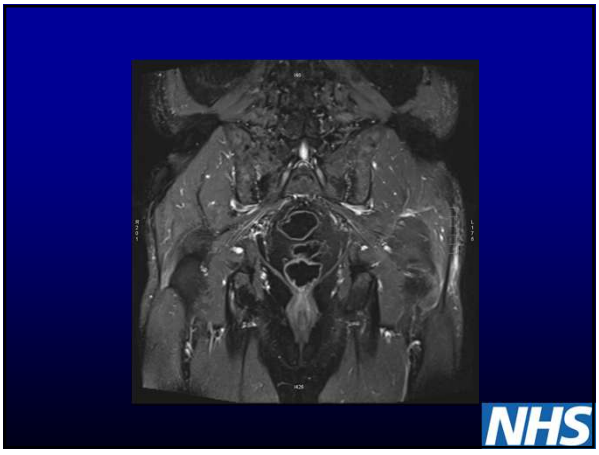
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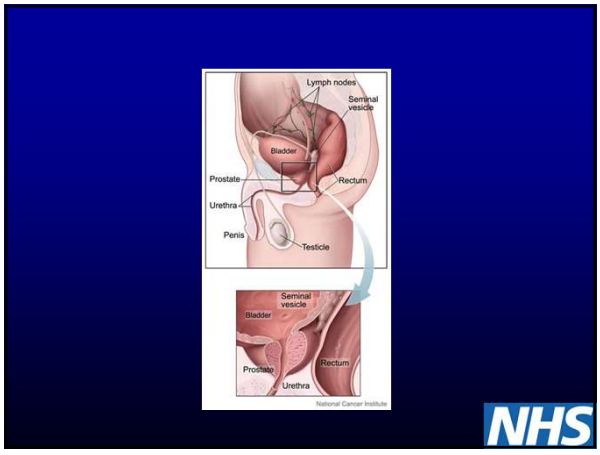
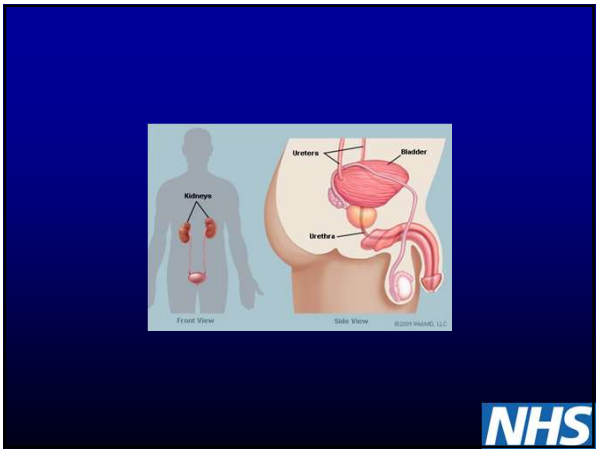

Lymph nodes
Seminal vesicle
Bladder
Prostate
Rectum
Urethra
Penis
Testicle
Seminal vesicle
Bladder
Prostate
Rectum
Urethra
National Cancer Institute
NHS


Kidneys
Ureters
Bladder
Urethra
Front View
Side View
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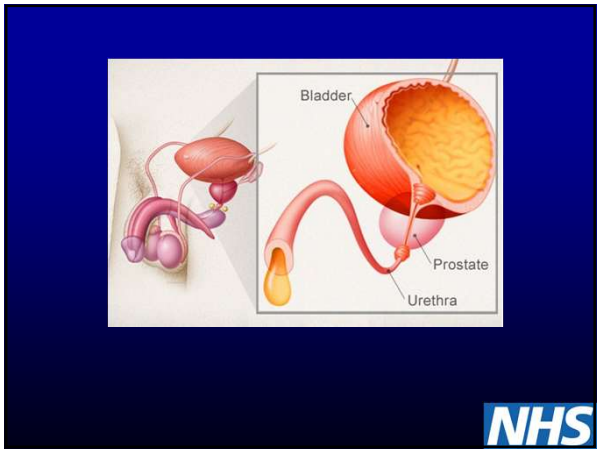
Bladder
Prostate
Urethra
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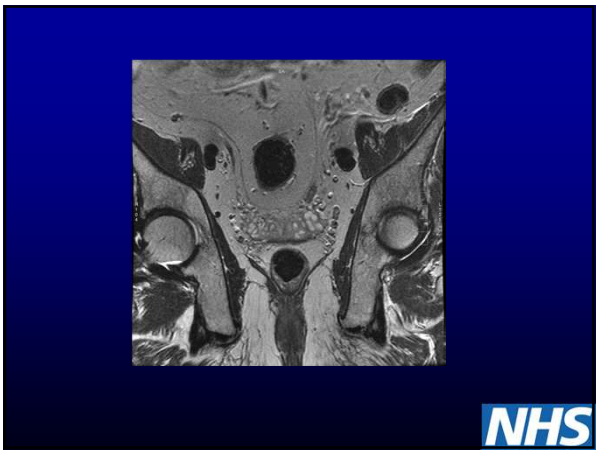
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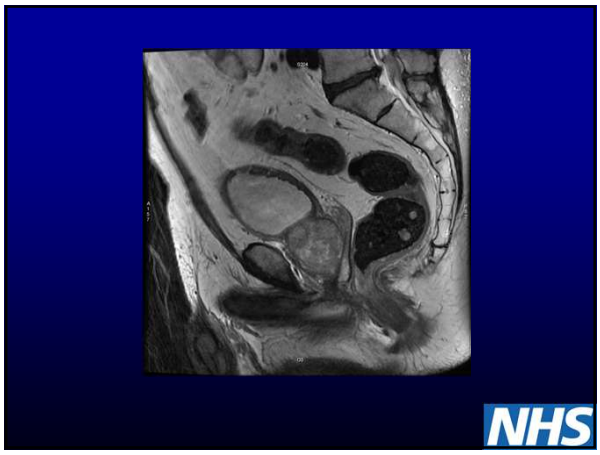
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Notes

Record your notes from the workshop here