



3D Transperineal Ultrasonography of the Pelvic Floor Anatomy and Its Dysfunction

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Introduction

- Pelvic floor dysfunction is one of the common conditions encountered in female patient's especially uterine descent; cystocele and rectocele are faced by elderly parous women.
- About 11-15% of the general populations who attend outpatient department suffer from various degrees of these problems.
- Ultrasound imaging of pelvic floor will help the patient from unnecessary complications and reduce the morbidity by delineating pelvic floor anatomy with dynamic studies.
- Transperineal Ultrasound is an underutilized US gem to assess various pelvic floor disorders.

- To assess the role of transperineal ultrasound in diagnosing various pathologic pelvic floor dysfunctions
- To explore the role of transperineal ultrasound for the integrity of anal sphincter complex muscles

Materials & Methods

- The current study was conducted at SMIMER hospital of 1 year duration and consisted of total 11 patients.
- The 3D US in evaluating the anatomy and pathology of the pelvic floor.
 - Simple volume scanning d/b GE Voluson S8
 - Transabdominal & TV/TR 3D transducers
 - perineal approach
 - 3D static
 - 4D dynamic approach with “cine loop”feature.

Aims & Objectives

- To define normal pelvic floor anatomy using
- 3d transperineal ultrasound

The Pelvic floor /Pelvic diaphragm

The pelvic floor is divided into three compartments

- Anterior
- Central or middle

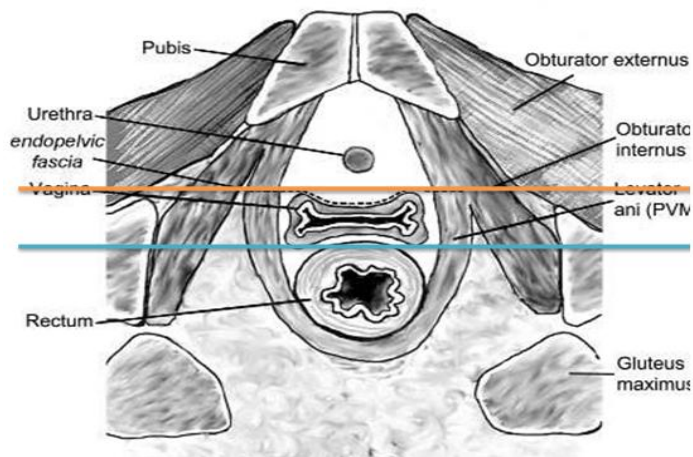
- Posterior

Pelvic floor

A. Levator Ani

- Puborectalis
- Pubococcygeus
- Iliococcygeus

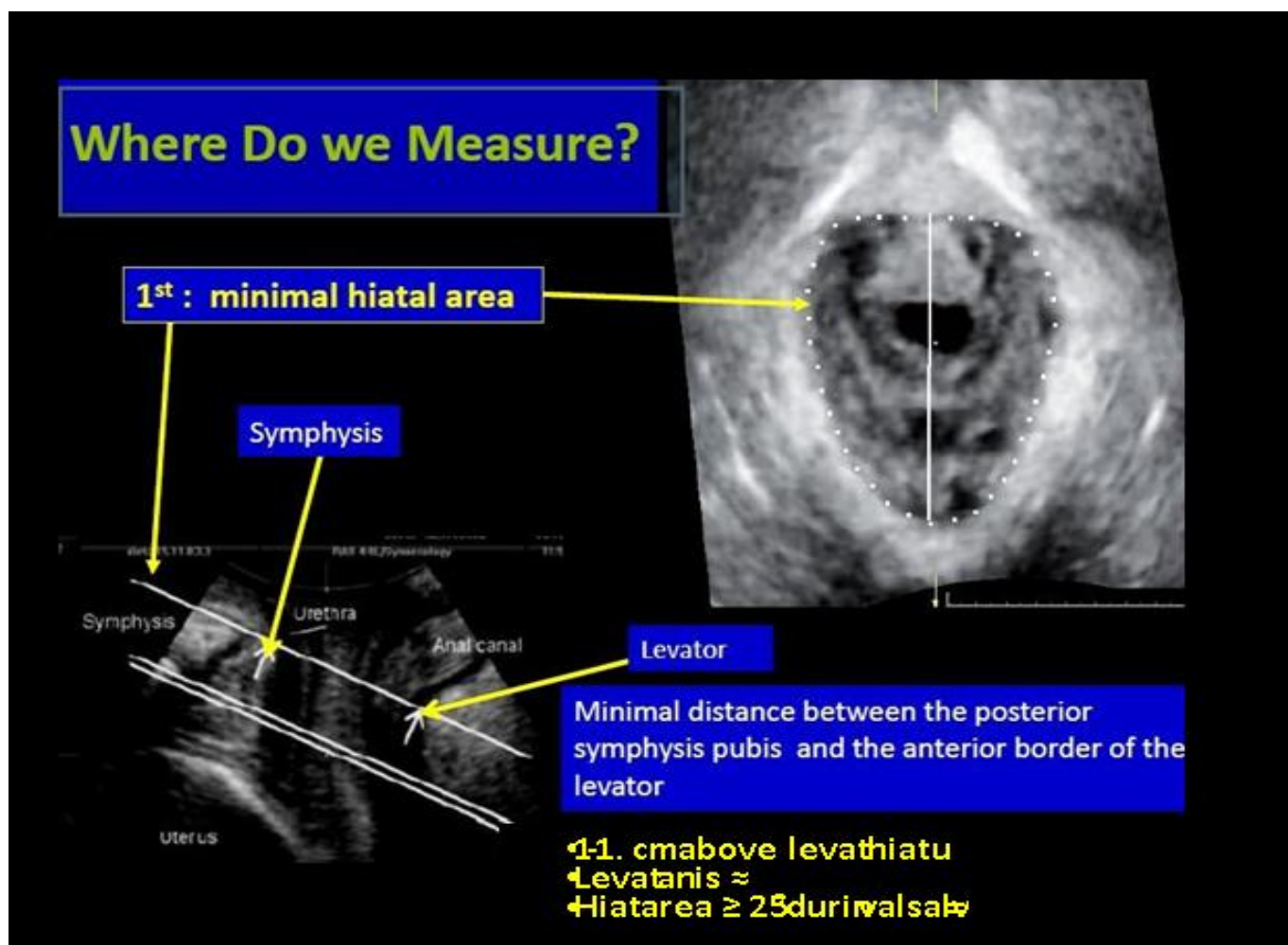
B. Coccygeus



Indications for Pelvic Floor Us

- ◆ Recurrent Urinary tract infections.
- ◆ Symptoms of voiding dysfunction
- ◆ Symptoms of prolapse i.e. sensation of lump or dragging sensation urinary incontinence.
- ◆ Urgency, frequency, nocturia &/or urge
- ◆ Symptoms of obstructed defecation e.g.
- ◆ Stress urinary incontinence(SUI) straining at stool or perineal digitation & sensation of incomplete bowel emptying,
- ◆ Insensitive urinary loss fecal incontinence
- ◆ Bladder related pain
- ◆ Pelvic or vaginal pain after
- ◆ Persistent Dysuria incontinence/ prolapse surgery
- ◆ Vaginal discharge or bleeding after anticontinence or prolapse surgery

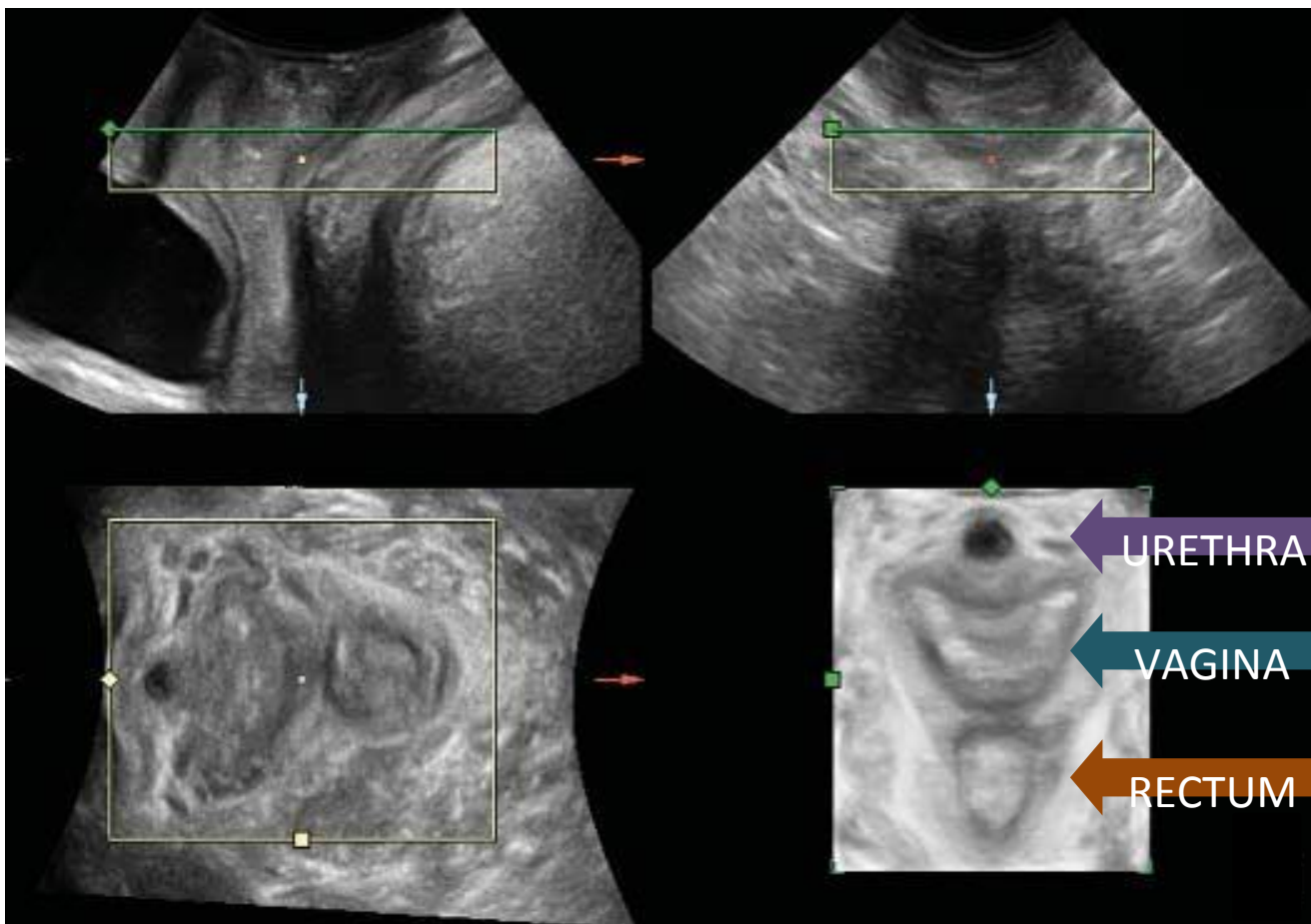
Function: is to support the pelvic viscera and maintain continence.

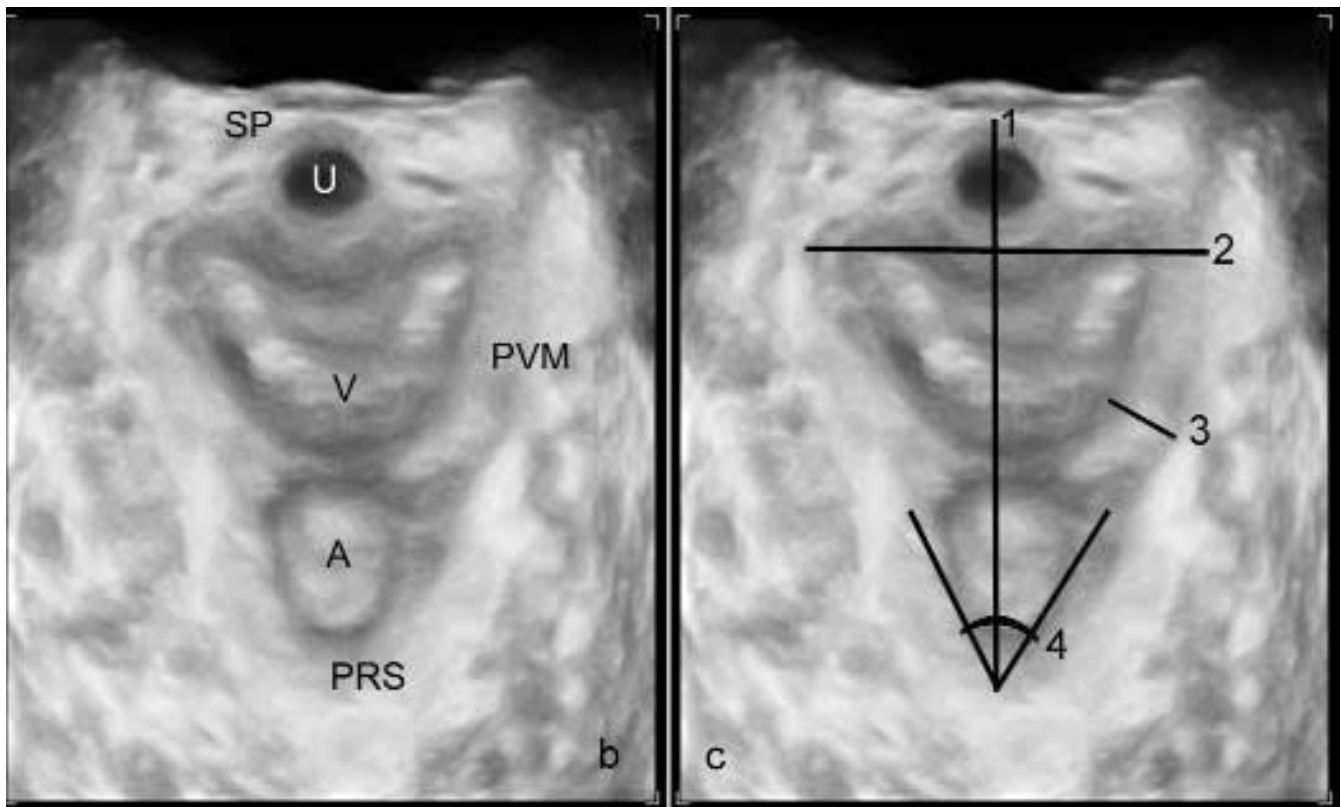


3D US

- 3D/4D has improved the ability to visualize the pelvic floor.
- Allows easy pre and post-operative images.
- Displays images similar to MRI :
 - Coronal,axial & sagittal (parasagittal views).
 - Axial rendered view is very important and informative.
 - Several studies have corelated structures seen on MRI as being the same on 3D US.

Multiplanar projection of a normal pelvic floor examination. The top left A plane shows the midsagittal plane, whereas the C plane and rendered image show the pelvic hiatus in the axial plane. The bounding box is placed tightly around the region of interest with the active (green) side at the top. Slight rotation of the A-plane image around the z-axis may be necessary to optimize this view. The slice thickness is set to the thinnest feasible to avoid missing small findings.





PELVIC FLOOR MEASUREMENTS

LAT HIATAL DIAMETER

AP HIATAL

DIAMETER

LEVATOR ANI THICKNESS

LEVATOR ANI ANGLE

Some of the commonly used measurements for assessment of the hiatus:

1. anteroposterior hiatal diameter

2. lateral hiatal diameter

3. levator ani thickness

4. levator ani angle

Dysfunction of the Pelvic floor

- Levator avulsion is associated with anterior & central compartment prolapse.
- Child birth is an important factor.

I) Unilateral levator trauma (avulsion)

- is associated with difficult child birth & include long second stage, forceps delivery & anal sphincter laceration.

(II) Bilateral levator trauma (avulsion) :-

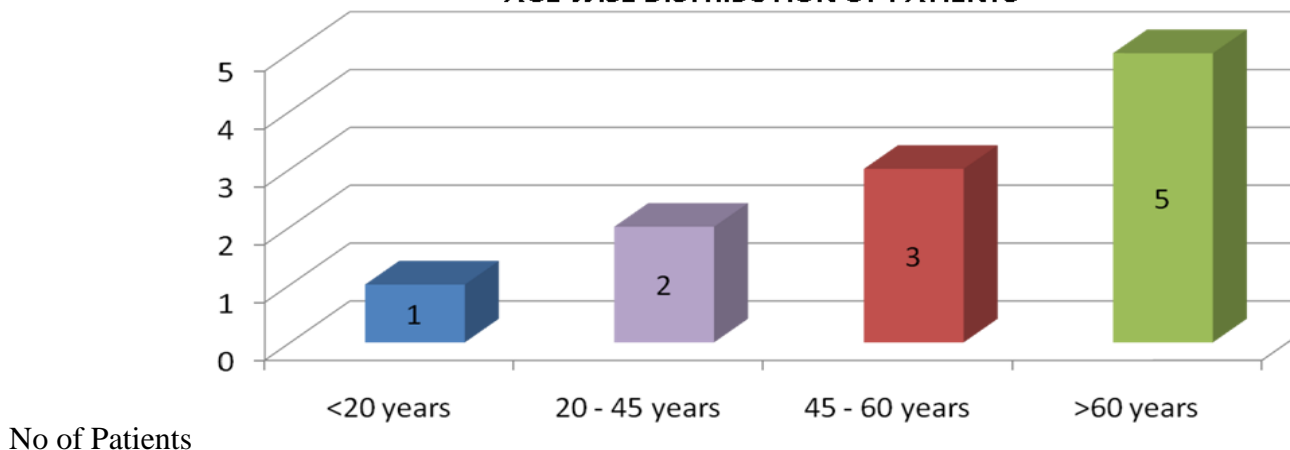
- Bilateral defects are hard to palpate. The larger a defect is, both in width & depth, the more symptoms and /or signs of prolapse.
- **Levator avulsion seems to atleast triple the risk of anterior and central prolapse.**

Results

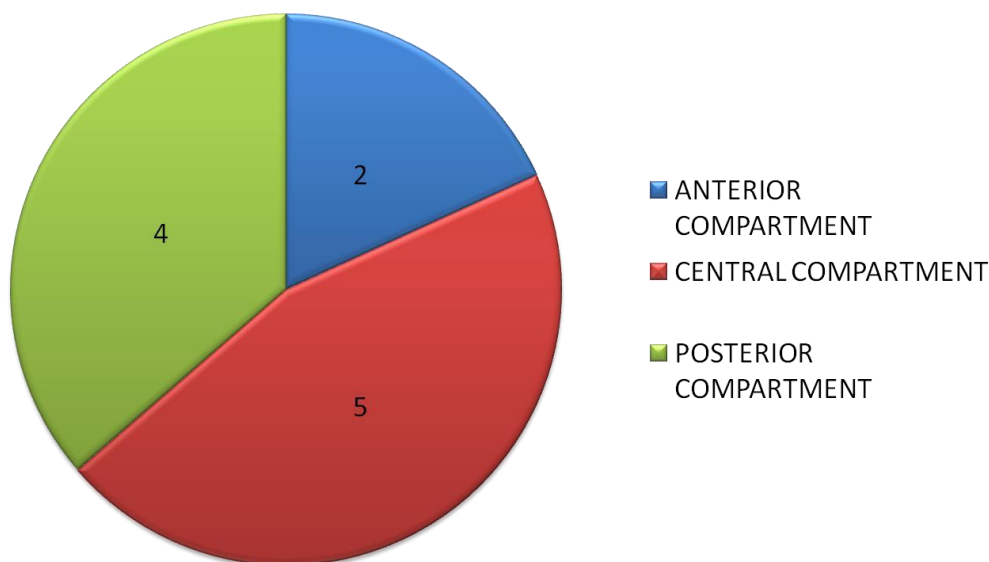
- 3D TPUS was applied for evaluation of the anterior, central & posterior pelvic floor compartments in our institute for 11 patients.

young Reproductive Perimenopausal Elderly

AGE WISE DISTRIBUTION OF PATIENTS



Compartment wise distribution of cases



In our study, most common pathologies noted were of central compartment viz., cervical

prolapse and procidentia, while disorders relating to anterior compartment were found to be least.

Pelvic Floor Disorders (Diagnosed on TPUS)

SUI

- Anterior Compartment
- Cystocele
- Central Compartment
- Uterine descent
- Posterior compartment
- Rectocele
- Enterocele

PERINEAL TEARS

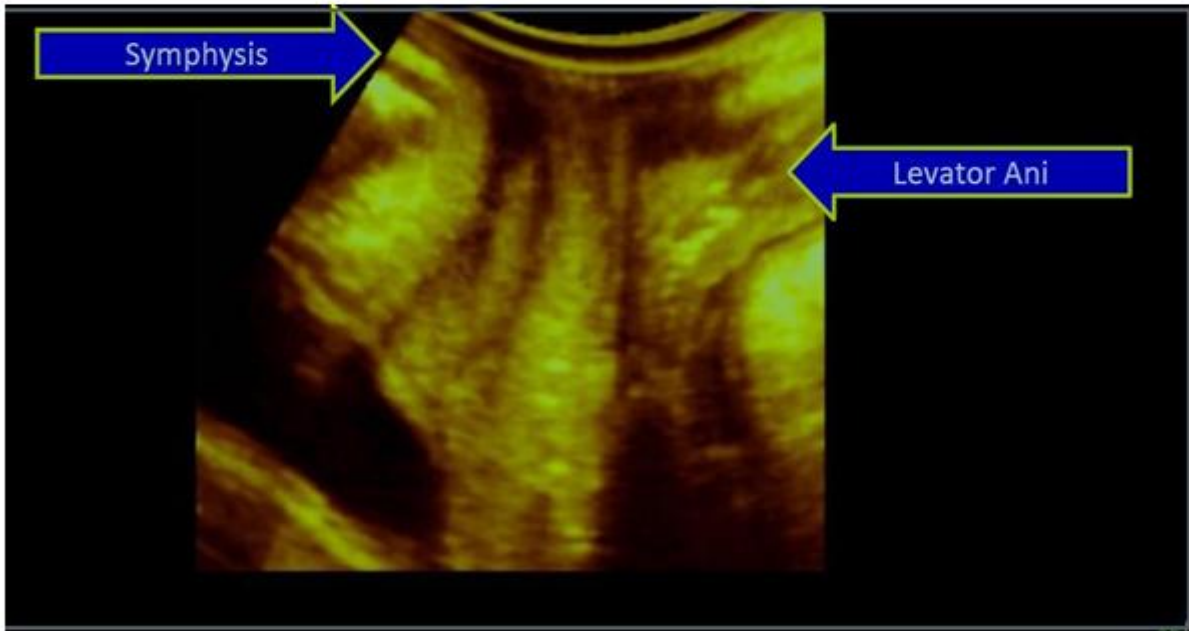
- Anal Sphincter tears
- Levator injuries

In the study we were able to diagnose both SUI associated disorders and perineal tears with equal exactitude. While disorders relating to prolapse such as cystocele, enterocele and rectocele were common in perimenopausal and elderly women, perineal tears were diagnosed in younger patients.

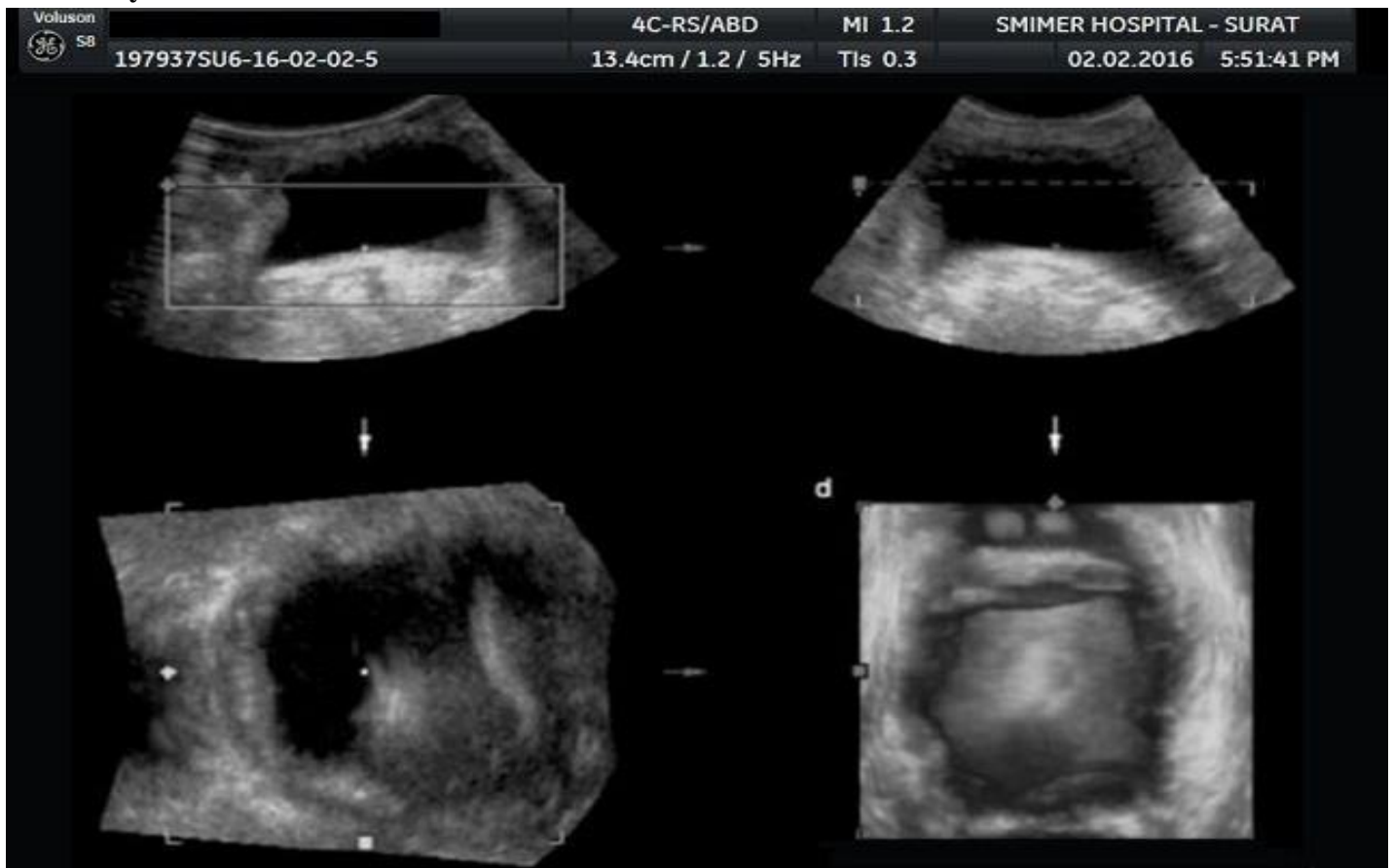
What disorders can be diagnosed using the mid-sagittal view ??

Disorders such as

- anterior vagina wall prolapse (cystocele) and
- posterior vaginal wall prolapse (rectocele)



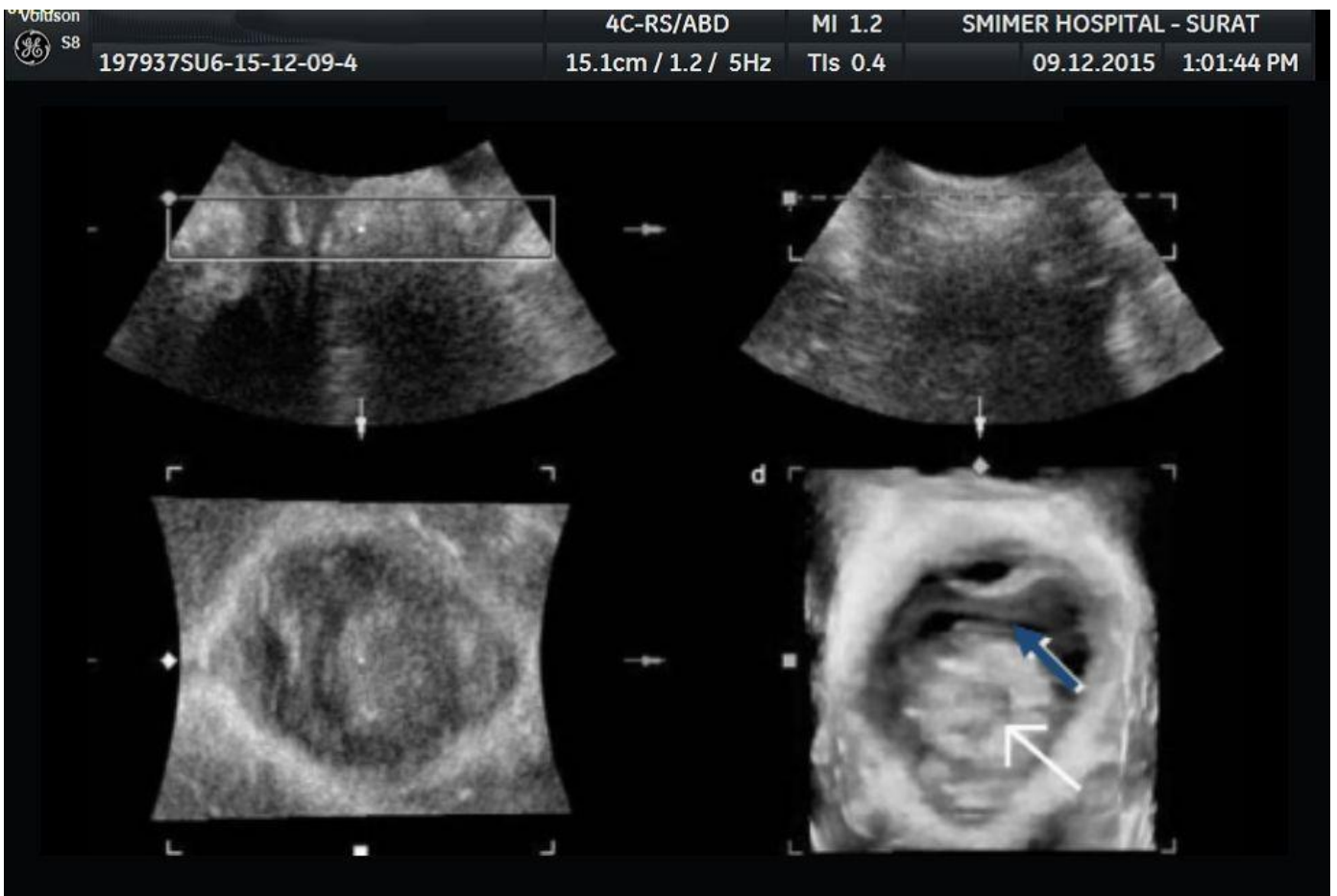
Case 1: Cystocele



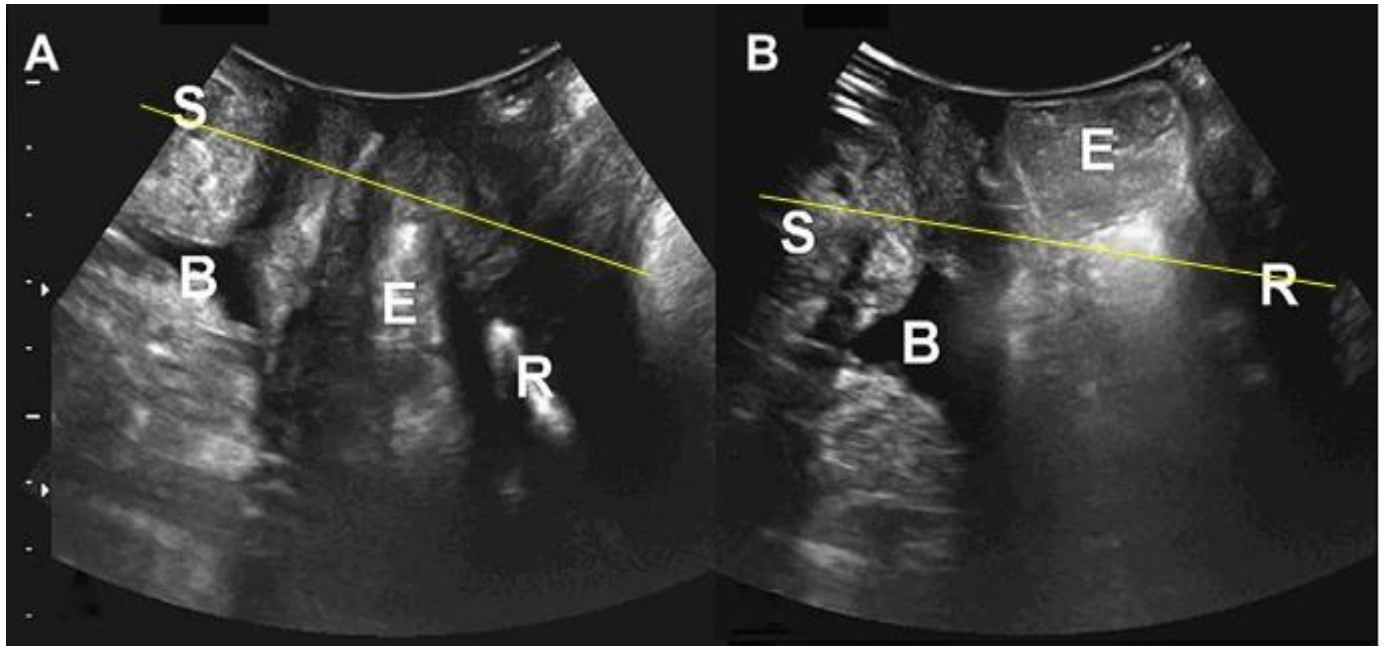
Case 2 – Cervical prolapse



Case 3 : Rectocele



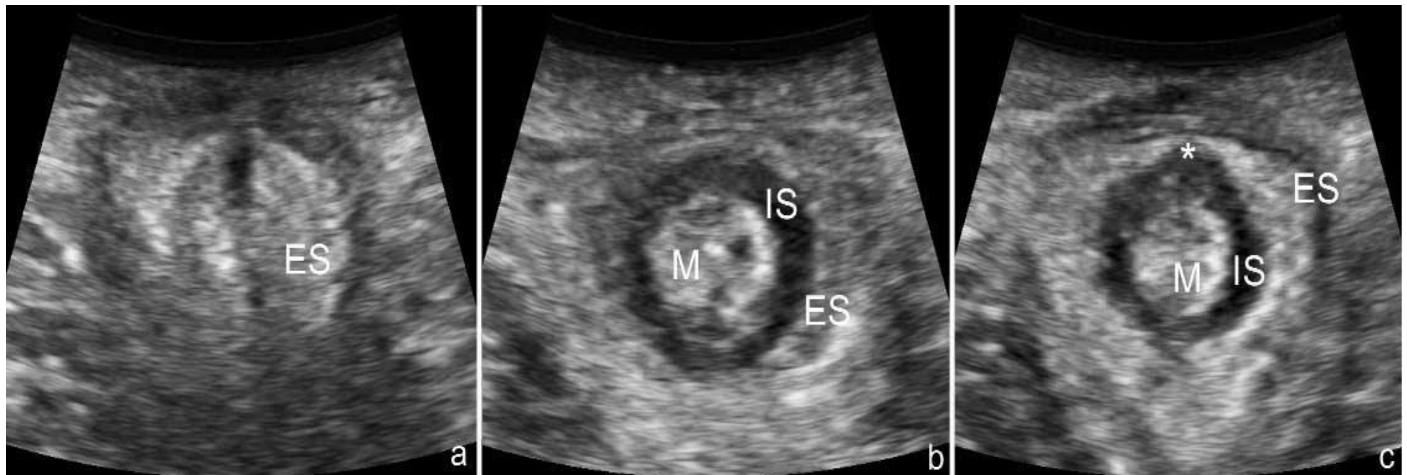
Case 4 : Enterocele



NORMAL MID SAGITTAL VIEW

DURING VALSAVA

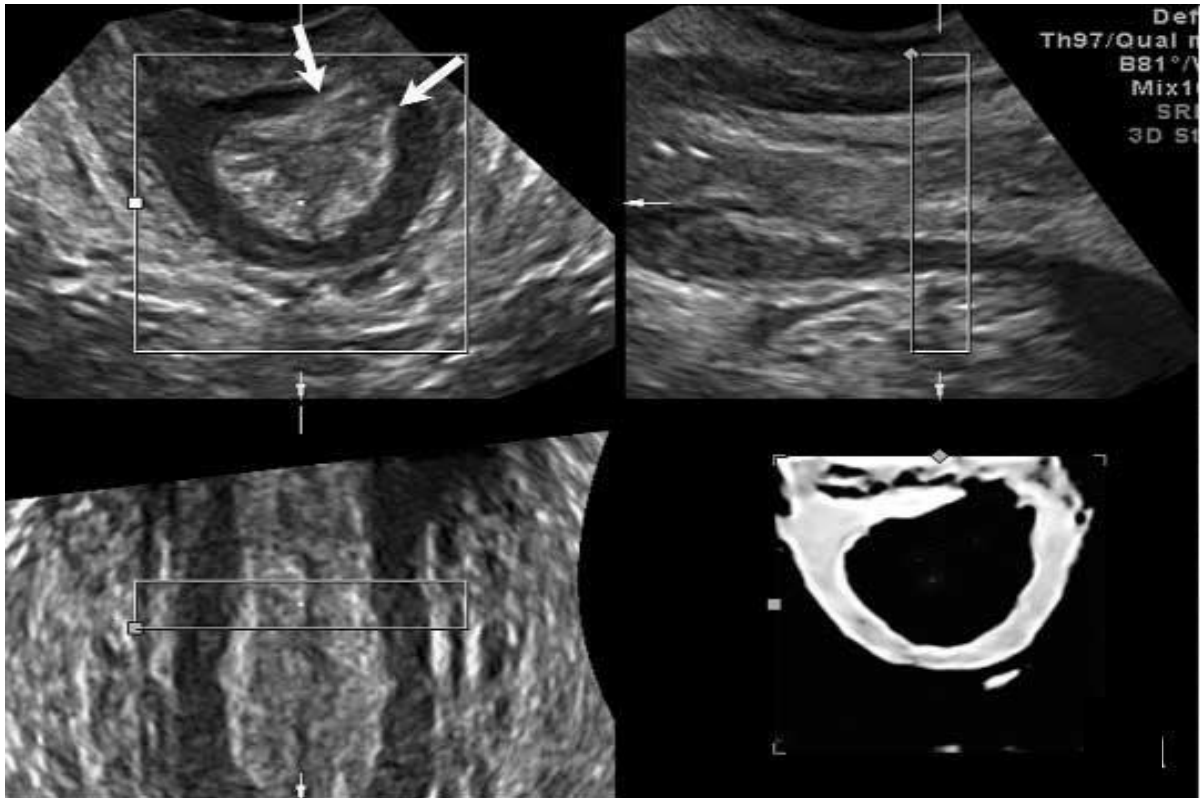
**Normal Anal sphincter
(as seen on TPUS)**



a and b, Normal transverse scanning planes of the anal sphincter complex at the anal verge and the ES at the midpoint of the anal canal, where measurements are usually taken.

In the most proximal area to the anorectal junction, normal anatomic thinning of the ES (asterisk) should not be misconstrued as a defect.

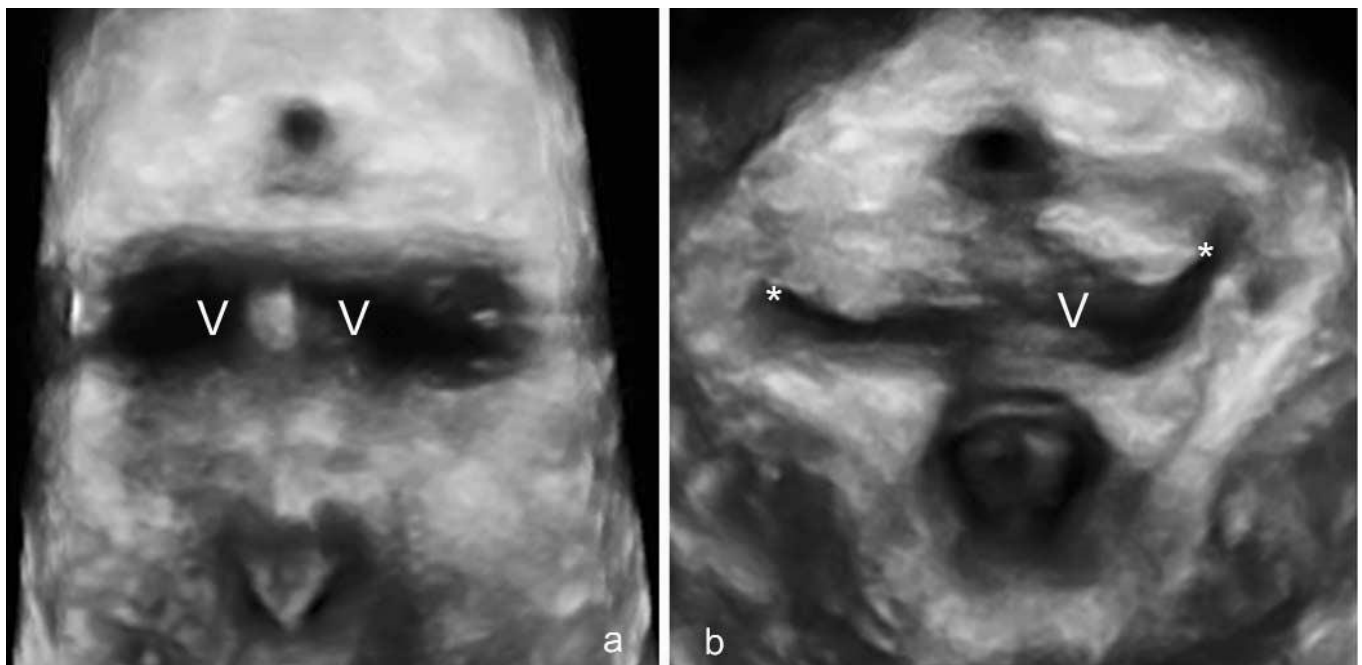
Case 5 : Anal sphincter Tear



This was a case of 24yrs male patient with h/o fall from a tree and resultant internal sphincteric injury from a wood sharpenel, Multiplanar projection of

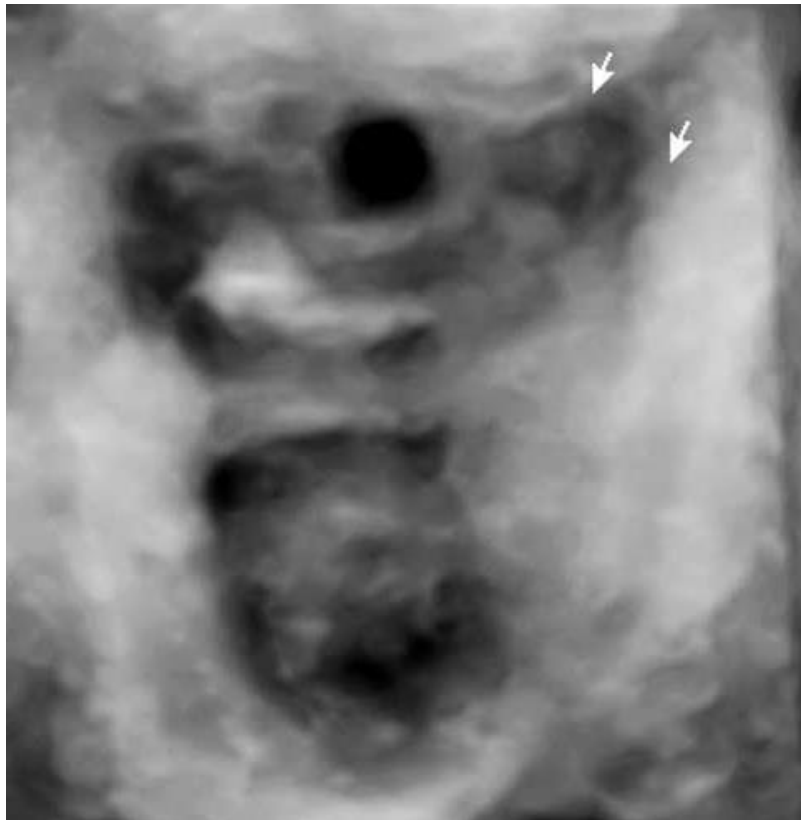
a sphincter tear. Arrows mark the tear in the A plane. Compare the inversion mode-rendered image at the bottom left of the MPR

Case 6 : Levator ani trauma



Rendered images from 2 symptomatic women referred for pelvic floor surgery. Note the absence of the normal smiley appearance of the vagina (V) which might indicate trauma to the endopelvic

fascia, and discontinuity of the levator ani contour (asterisks), which might be a sign of earlier levator trauma.

Case 7: Postpartum unilateral levator ani detachment in an axial rendered image of the pelvic hiatus

- In the present study maximum age recorded was 63 years and minimum was 24 years. As for the symptomatology of pelvic floor dysfunction are concerned most of the patients came for increased frequency of micturition, burning micturition, pelvic pain and uterine descent.
- Follow up of few cases that got operated were scanned to look for vault prolapse. It was helpful in assessing the pre and postsurgical repair in patients of pelvic organs prolapse.
- Practical application by well designed & sufficiently powered clinical studies will establish the association between the clinical presentations of dysfunction with USG findings.
- Ultrasound is an invaluable, minimally invasive, highly accurate and cost effective procedure for assessment of pelvic floor movement of uterus, bladder and rectum with strain is best assessed on real time ultrasound.
- 3D/4D US of the pelvic floor is gaining acceptance as the modality of choice to evaluate the pelvic floor.
- It also yields reliable assessment of the morphological defects in anal sphincter complex muscles.
- Advantages over dynamic MRI includes cost and wide availability.

Conclusion

- Pelvic floor disorders are very common & strongly associated with female gender, ageing, pregnancy, parity and instrumental delivery.

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