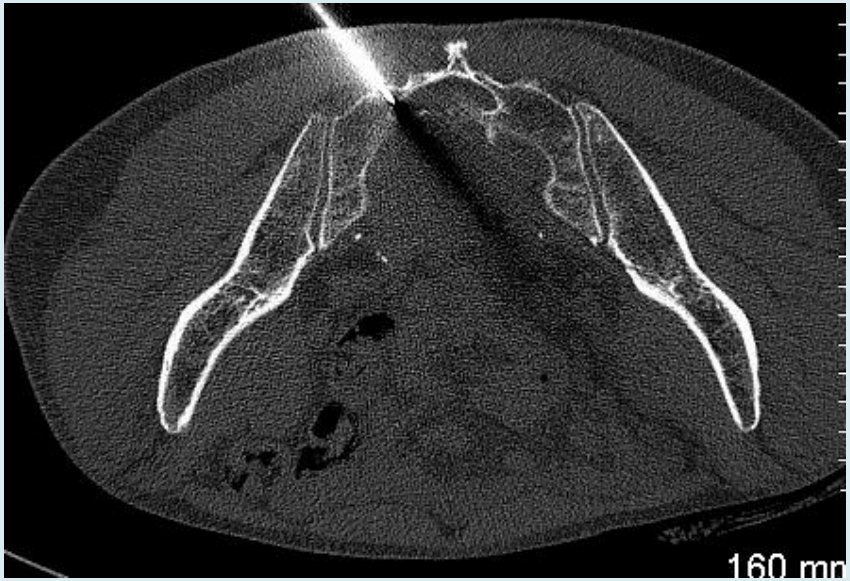
The multidisciplinary management of pre-sacral lesions, including percutaneous biopsy



A. N. Murphy, A. Sterling, E. Kavanagh, H. Fenlon, C. Cronin.

Mater Misericordiae University hospital, Phibsborough, Dublin, Ireland

Learning objectives

- To be aware of the current practices involving biopsy and operative management of pre-sacral lesions.
- To develop an insight into the multidisciplinary team involved in the management of pre-sacral lesions.
- To develop knowledge that will aid surgical planning.

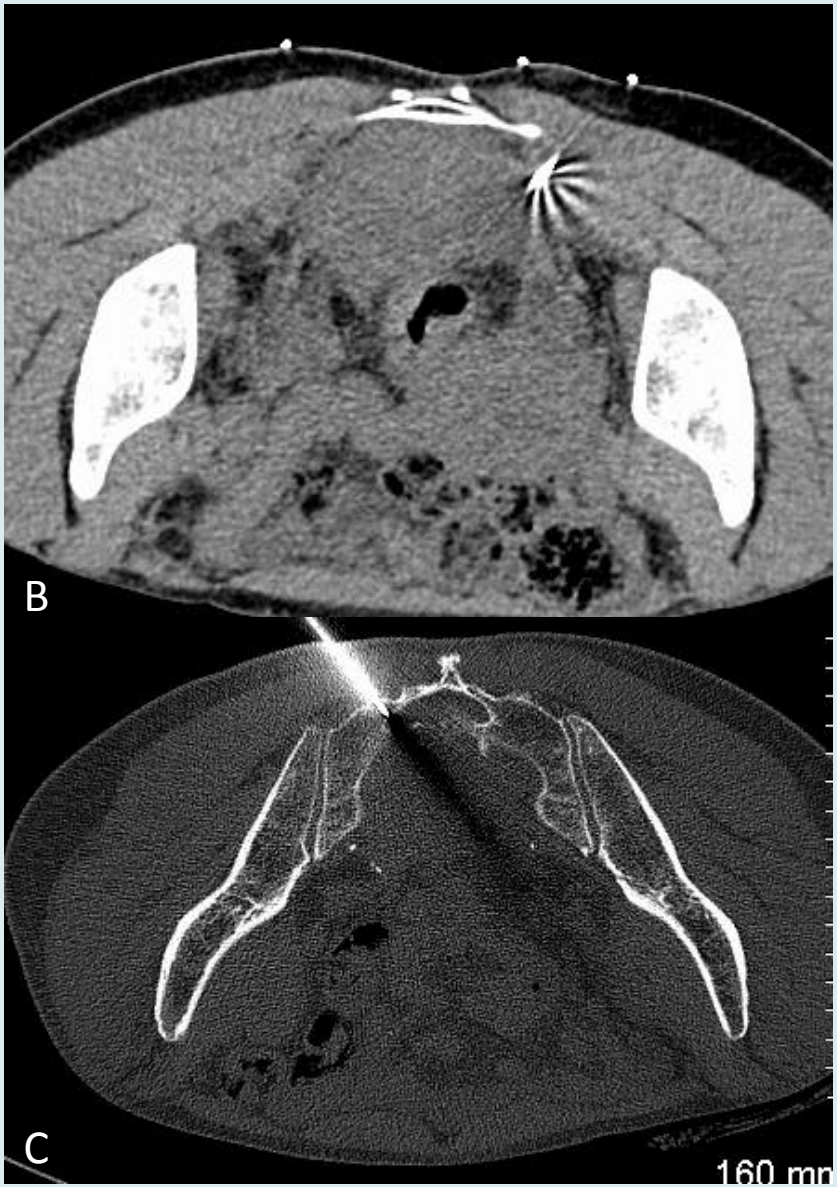
Background

- Pre-sacral pathology may be congenital or acquired, benign or malignant, and can originate from osseous, neurogenic or soft tissue structures. Pathology can originate in or spread to the pre-sacral space.
- A multidisciplinary team (MDT) management approach is key, with input from radiologists, surgical specialists, pathologists, and Medical and Radiation Oncologists.
- MDT discussion can assist in the diagnosis, biopsy and operative planning of pre-sacral lesions[3].

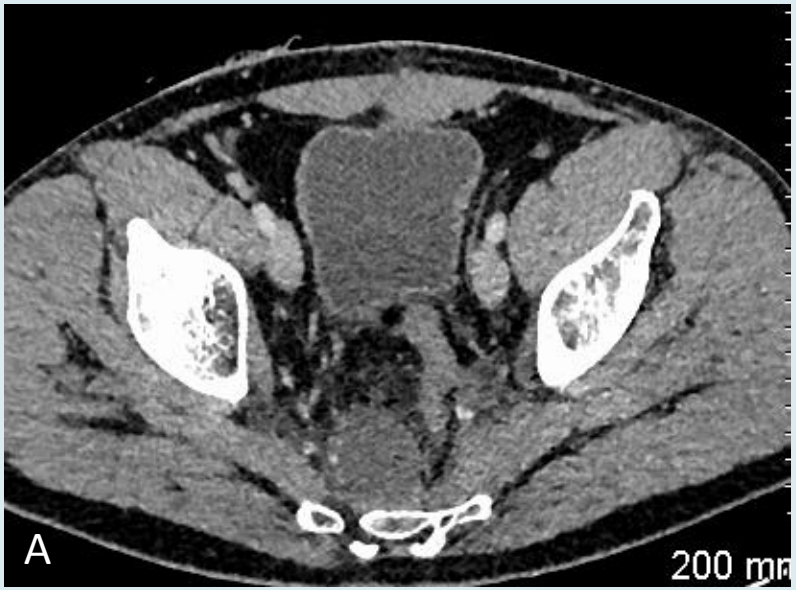
Preoperative biopsy

- In the past pre-operative biopsy was considered contraindicated in any presacral lesion that was surgically resectable.
- However pre-operative biopsy is useful in cases that may benefit from neo-adjuvant chemotherapy[1,3].
- Predominantly cystic lesions should not be biopsied due to the risk of complication and unlikely benefit as the vast majority are benign.
- If a malignant process is biopsied, the biopsy tract must be removed en bloc due to the theoretical and anecdotal risk of seeding which restricts surgical options[4,9].
- As the biopsy track must be removed en-bloc, transperitoneal, transvaginal, and transrectal biopsies must be avoided
- There is also a risk of secondary infection, fistula formation or meningitis.

To biopsy or not to biopsy?



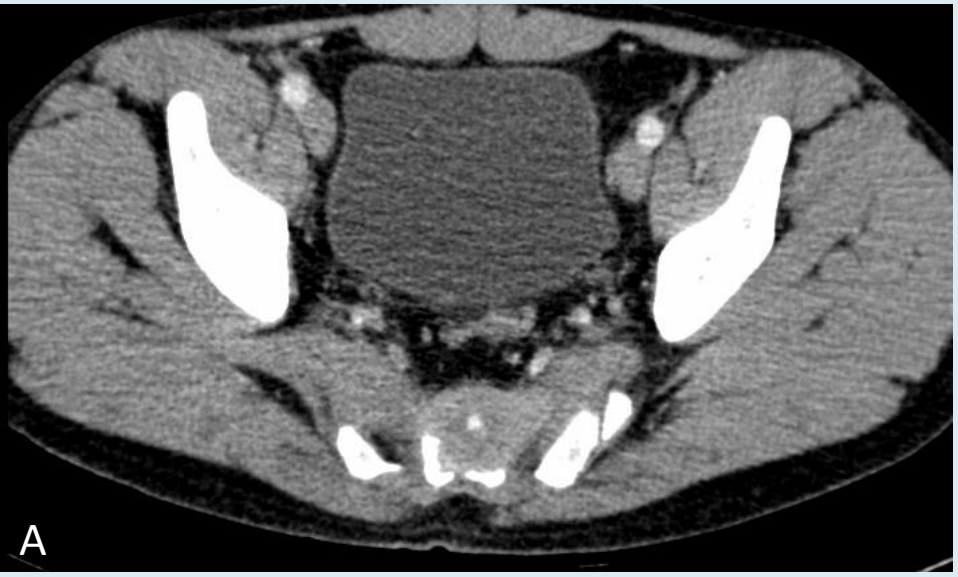
Certain pre-sacral conditions, such as the pre-sacral abscess displayed below(A) , should not be biopsied if their imaging appearances are suggestive in the correct clinical context. However, this solid pre-sacral lesion pictured to the left (B and C) had an aggressive appearance and was biopsied to guide management.

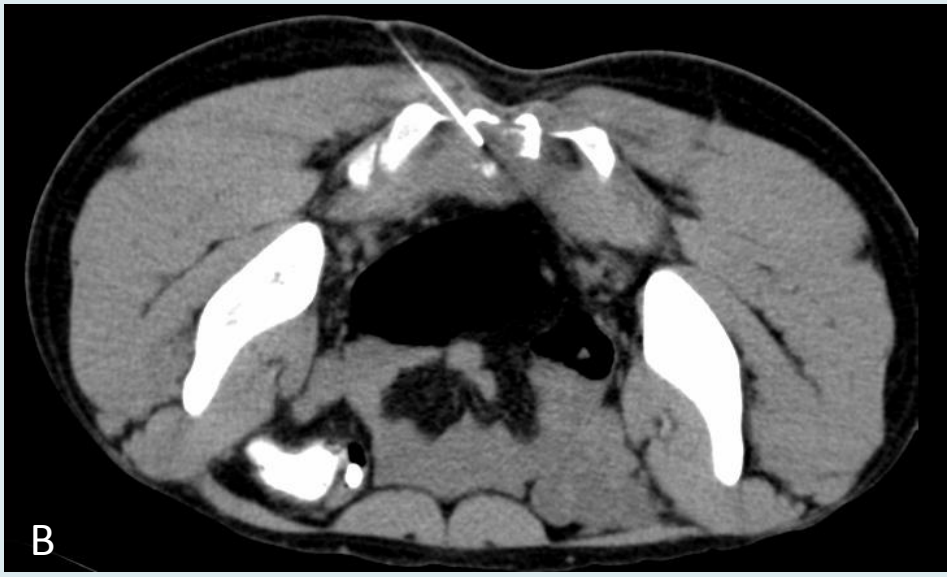


Preoperative biopsy: the upside

- However if imaging features are suggestive of a solid malignant lesion such as Ewing sarcoma, osteosarcoma, or neurofibrosarcoma, pre-operative biopsy should be considered as these conditions may benefit from neo-adjuvant chemotherapy[1,3].
- There is emerging evidence that chordomas and chondrosarcomas, previously thought to be chemoresistant, show promising results with tyrosine kinase inhibitor neoadjuvant therapy[1,4].
- If surgical resection is not clinically appropriate, biopsy can guide palliate chemotherapy or radiotherapy.

This 34 year old male, who was otherwise well, presented with weight loss, sacroiliac tenderness, and night sweats.

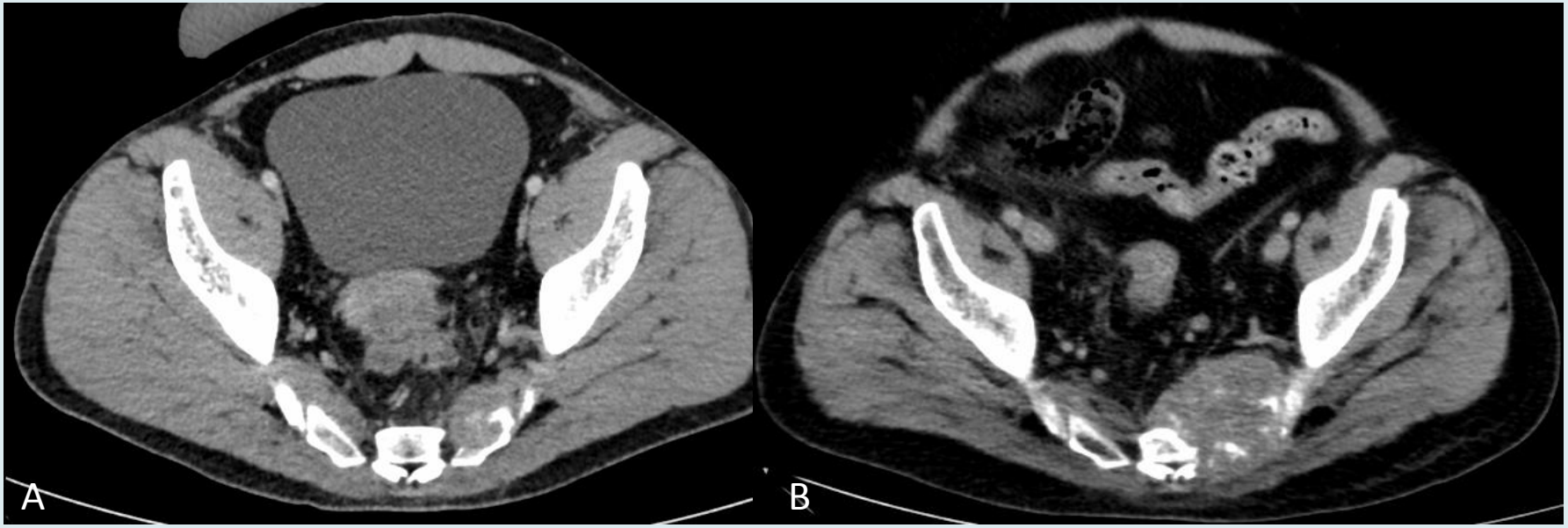


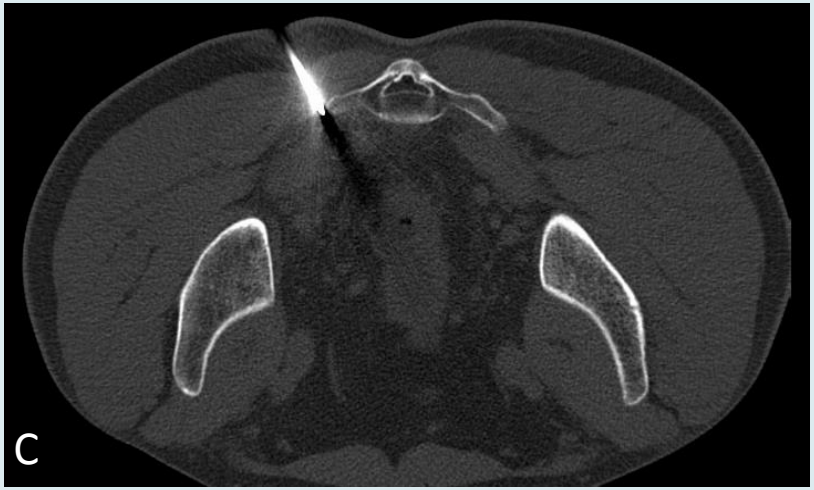


A: Axial CT showed a soft tissue pre-sacral mass causing bony destruction.

B: He underwent a CT guided biopsy which confirmed tuberculosis.

This 41 year old male had a recent history of rectal cancer treated with neoadjuvant chemoradiotherapy however had had a poor response.





A:CT displays a partially calcified deposit in the left pre-sacral region, eroding bone.

B: Short interval CT follow up displayed rapid enlargement.

C: This was biopsied and metastatic disease confirmed.

Surgical management

- Total resection is the treatment of choice for most pre-sacral lesions as even if the lesion is benign it can cause complications such as infection, fistulation, mass effect and undergo malignant transformation [1,3,5].
- Colorectal surgeons generally manage pre-sacral lesions, however depending on the exact origin and pelvic organ involvement, input may be needed from orthopaedic, vascular, urology or gynaecology specialists[1,3].
- Invasion into an adjacent structure (nerve roots, musculature, viscera, vasculature) or considerable contact may indicate the need for additional expertiese in addition to the primary surgeon[3].
- In cases where there is to be resection of sacral nerves, a neurosurgeon or orthopedic spinal surgeon is essential[1].

Surgical approach dictated by:

- Nature of the lesion
- Location in relation to the sacral levels
- Size and craniocaudal extent of the lesion
- Sacral involvement
- Pelvic sidewall (piriformis, obturator internus muscles, sacrotuberous and sacrospinous ligaments)
- Local viscera involvement (rectum, uterus, ureters, internal iliac vessels)

Imaging findings

- The imaging findings dictate the surgical approach which is decided at MDT, taking into account the size, nature and invasiveness of the lesion.
- Three common approaches include anterior approach, posterior approach and combined abdominoperineal approach[1].
- The relationship of the lesion to the third sacral segment (S3) is important for surgical planning; lesions at or above S3 call for an anterior approach, while lesions below call for a posterior approach. When there is disease above *and* below S3, a combined approach is called for[1,4].

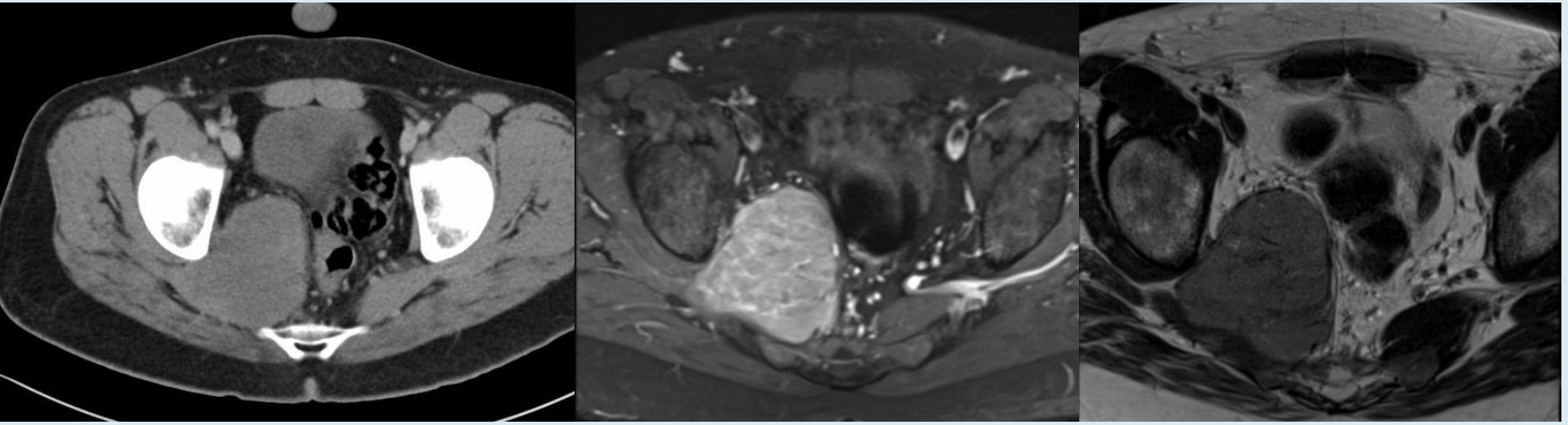
Post surgical complications

There is a high post-operative morbidity. For anatomic reasons, postoperative impairment of bladder, bowel, sexual, and ambulatory function is inevitable.

Although unilateral resection of all the sacral nerve roots will not compromise fecal and urinary function, if both S-3 nerve roots are resected, the external anal sphincter will not function and the patient will become incontinent.

A majority of the sacrum can be resected if necessary as long as more than half of the S1 vertebra is preserved. However, an extensive sacrectomy can be associated with significant perioperative morbidity and functional disability.

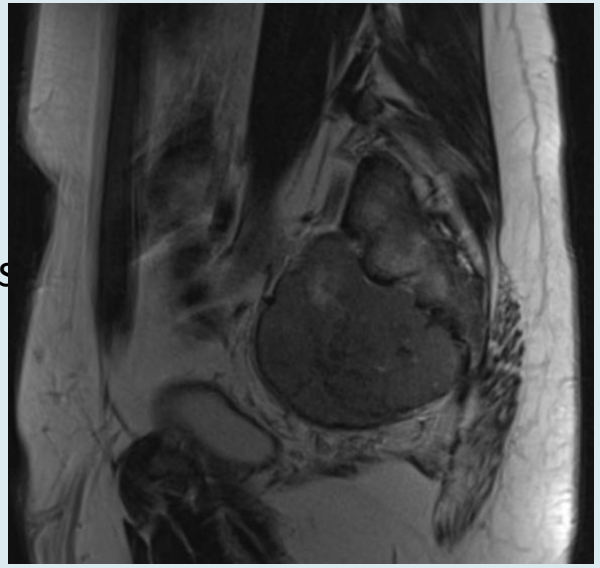
Ewings Sarcoma



These are CT and MRI images of the pelvis in a 33 year old male who presented with sensory loss over the right S1 nerve distribution.

MRI shows an aggressive appearing heterogenous soft tissue mass in right pre-sacral region involving the right piriformis, closely related to the right S1 neural exit foramen.

This was biopsied and diagnosed as an Ewing's tumour which was subequently resected.



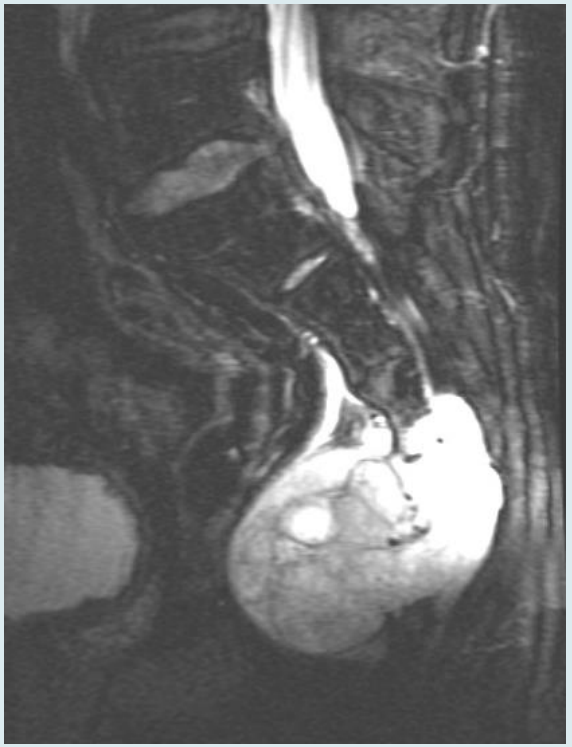
Sacral chordoma

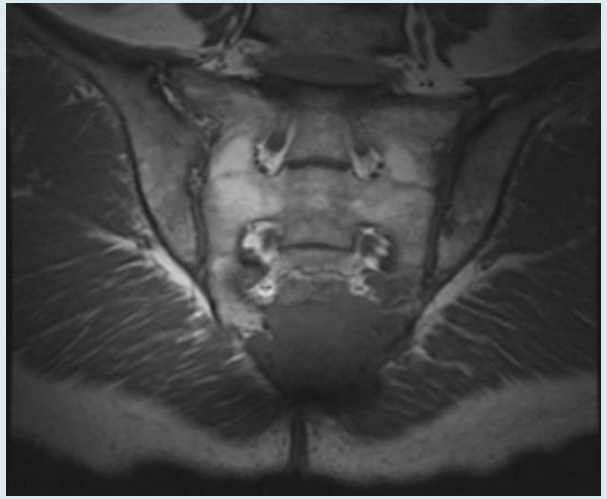
Chordomas are the most common primary sacral tumour[6] and are more common in males[9].

They appear as a large heterogenous soft tissue mass commonly containing calcification, extending into the sacral canal[2]. They are locally aggressive tumours[2,3] and cause lytic destruction.

On MRI, chordomas display low T1 and high T2 signal intensity, with variable contrast enhancement[2,3].

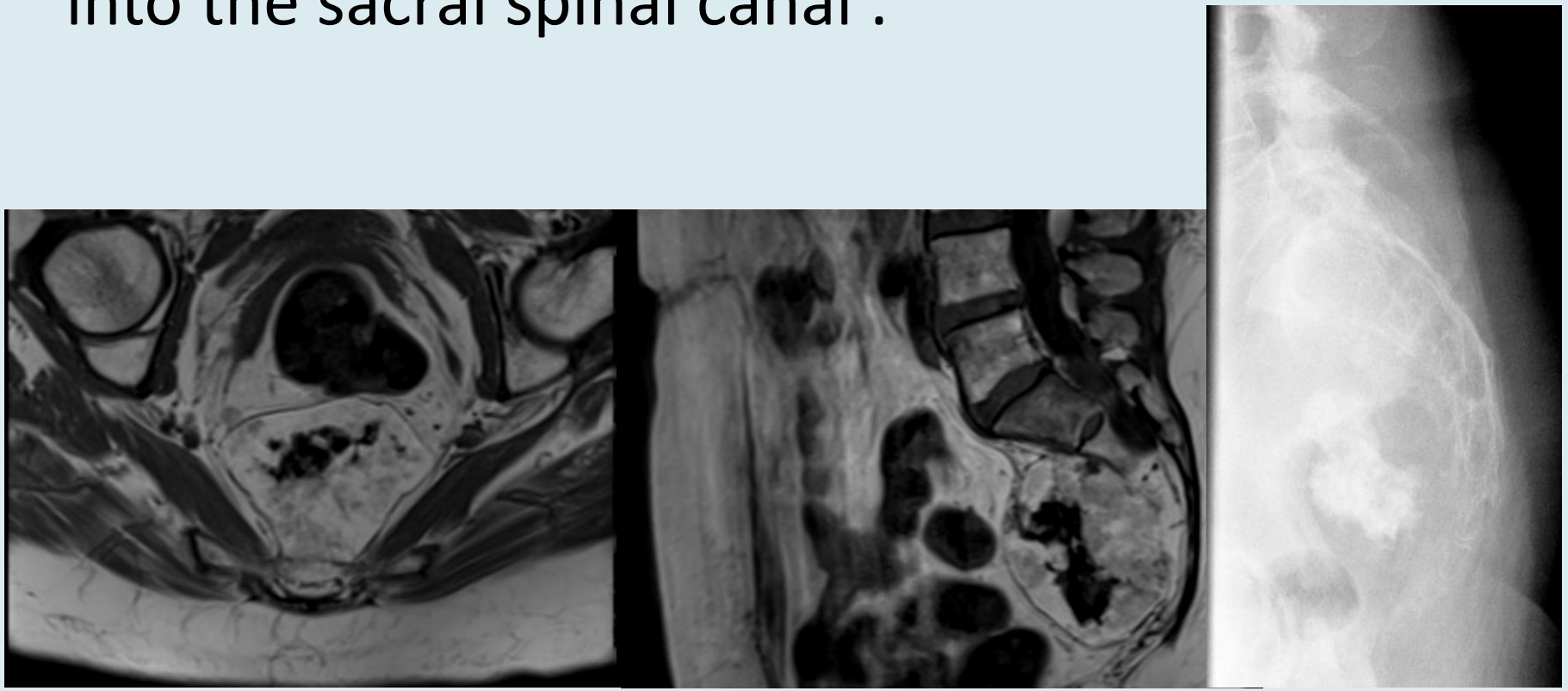
There is emerging evidence that chordomas and chondrosarcomas, previously thought to be chemoresistant, show promising results with tyrosine kinase inhibitor neoadjuvant therapy[1,4].

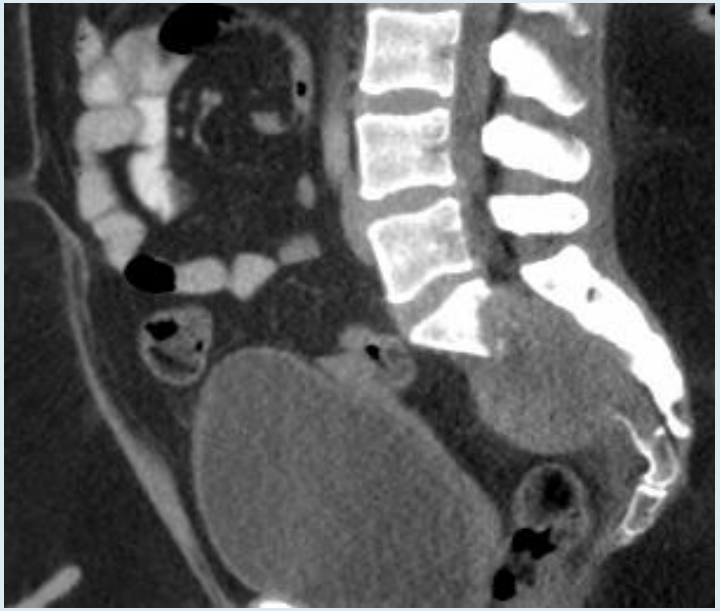


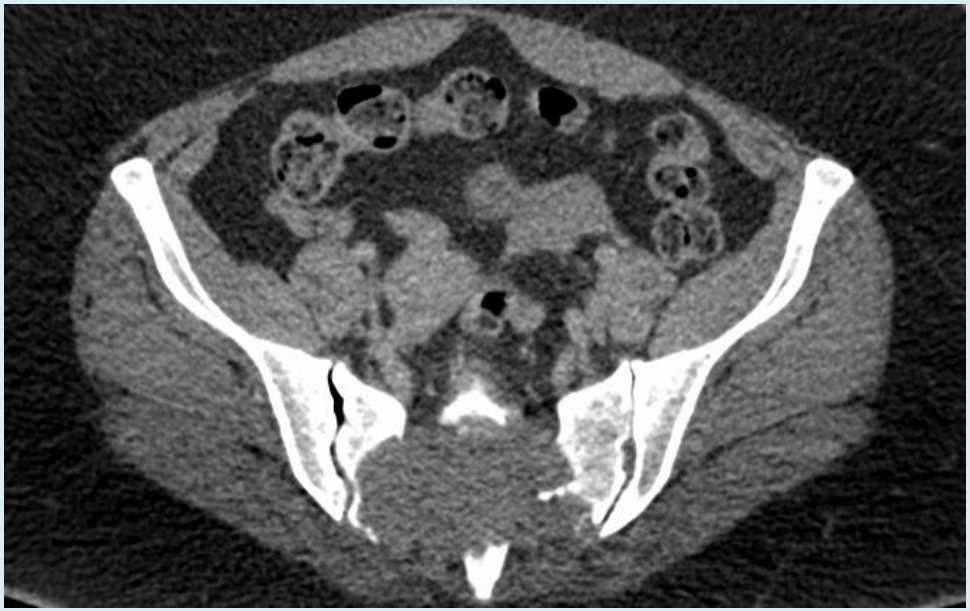


Low grade chondrosarcoma.

These MR images in a 66 year old female show an 8cm heterogenous mass with erosion into the sacral spinal canal .

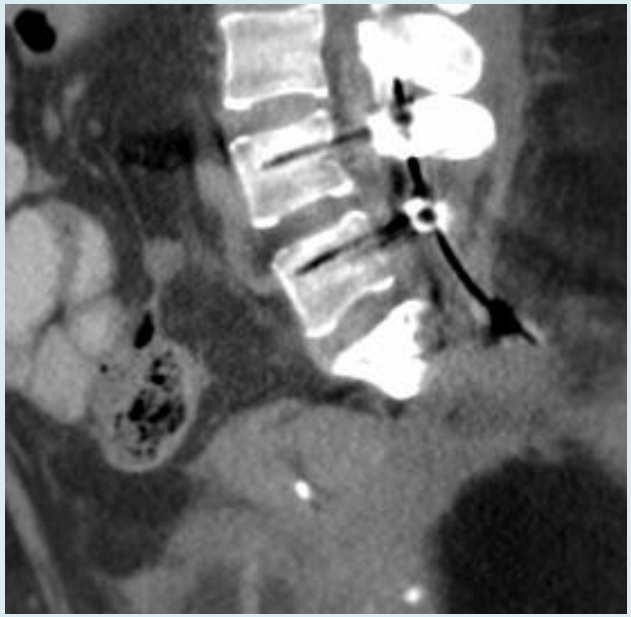






This 27 year old female presented with severe lower back pain.

CT displayed a large sacral tumour extending from the sacral canal into the pre-sacral space. The differential included chordoma or other neural element tumours. CT guided biopsy was performed through a right transgluteal approach and histology revealed giant cell tumour. She underwent a sacrectomy and defunctioning colostomy.



Radiology report details addressing pre-sacral lesions

Consider patient demographics and presenting signs and symptoms.

Tissue of origin? Nervous tissue, bone or soft tissue?

Characteristics of the lesion? Solid/cystic, fat/haemorrhage/calcification, enhancement pattern?

Benign or aggressive appearance?

Surgical considerations:

- Site – in relation to S3 Vertebral Body
- Extent – in relation to S3 and other sacral levels
- Size – 3 dimensions
- Detail of invasion/ extent of invasion into the sacrum, coccyx and lumbar spine
- Assessment of involvement of the nerve roots and spinal canal
- Assessment for invasion into pelvic sidewall - piriformis, obturator internus muscles, sacrotuberous and sacrospinous ligaments
- Local viscera - rectum, uterus, ureters, internal iliac vessels
- Venous obstruction / Deep Venous Thrombosis.
- Possible ureteric involvement and potential need for ureteric stents to aid in the intraoperative identification of the ureters.

Conclusions

- An MDT approach to the management of pre-sacral lesions is key.
- Advances in imaging and percutaneous biopsy techniques have improved the evaluation and management of pre-sacral lesions in the recent past.
- Treatment is surgical; due to their complexity, many pre-sacral lesions need multiple sub-specialists' input.
- The relationship of the lesion to S3 is imperative.

References

1.Reiter MJ, Schwope RB, Bui-Mansfield LT, Lisanti CJ, Glasgow SC. Surgical management of retrorectal lesions: what the radiologist needs to know. AJR Am J Roentgenol. 2015;204(2):386-95.

2.Hain KS, Pickhardt PJ, Lubner MG, Menias CO, Bhalla S. pre-sacral masses: multimodality imaging of a multidisciplinary space. Radiographics. 2013;33(4):1145-67.

3.Patel N, Maturen KE, Kaza RK, Gandikota G, Al-Hawary MM, Wasnik AP. Imaging of pre-sacral masses--a multidisciplinary approach. Br J Radiol. 2016;89(1061):20150698.

4.Hopper L, Eglinton TW, Wakeman C, Dobbs BR, Dixon L, Frizelle FA. Progress in the management of retrorectal tumours. Colorectal Dis. 2016;18(4):410-7.

5.Lev-Chelouche D, Gutman M, Goldman G, Even-Sapir E, Meller I, Issakov J, et al. pre-sacral tumors: a practical classification and treatment of a unique and heterogeneous group of diseases. Surgery. 2003;133(5):473-8.

6.Glasgow SC, Birnbaum EH, Lowney JK, Fleshman JW, Kodner IJ, Mutch DG, et al. Retrorectal tumors: a diagnostic and therapeutic challenge. Dis Colon Rectum. 2005;48(8):1581-7.

7. Uhlig BE, Johnson RL. Presacral tumors and cysts in adults. Dis Colon Rectum 1975;18(7):581–589).

8. Dozois et al. The ASCRS Textbook of Colon and Rectal Surgery. New York: Springer; 2007:501–514

9. Jao SW, Beart RW Jr, Spencer RJ, Reiman HM, Ilstrup DM. Retrorectal tumors. Mayo Clinic experience, 1960-1979. Dis Colon Rectum. 1985 Sep;28(9):644-52.

10. McCune WS. Management of sacrococcygeal tumors. Ann Surg 1964; 159:911-811.

11. Hassan I, Wietfeldt ED. Presacral Tumors: Diagnosis and Management. Clinics in Colon and Rectal Surgery. 2009;22(2):84-93.

Author information

A. N. Murphy, Radiology resident, MMUH, Mater Misericordiae University hospital, Phibsborough, Dublin, IE

A. Stirling, Radiology resident, MMUH, Mater Misericordiae University hospital, Phibsborough, Dublin, IE

E. Kavanagh, Radiology Consultant, MMUH, Mater Misericordiae University hospital, Phibsborough, Dublin, IE

H. Fenlon, Radiology Consultant, MMUH, Mater Misericordiae University hospital, Phibsborough, Dublin, IE

C. Cronin, Radiology Consultant, MMUH, Mater Misericordiae University hospital, Phibsborough, Dublin, IE