

Three rare coccyx lesions

Jean-Yves Maigne

Hotel Dieu, 75004 Paris

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INTRODUCTION

Alongside the usual coccyx lesions, including instabilities (dislocation and hypermobility), spicules, and intradiscal inflammation, there are three other rarer lesions that risk being under diagnosed or going unrecognised. These are fractures of a particular type, intradiscal calcifications, and impingements between the bone and seat surface.

COCCYX FRACTURES

We observed three types of coccyx fractures, each affecting a different coccygeal vertebra with a different mechanism: C1 flexion fractures (if this vertebra is fused to the sacrum, otherwise S5), compression fractures to the first mobile coccygeal vertebra, and extension fractures of the last coccygeal vertebra after a difficult childbirth.

C1 or S5 fractures

These are the most common fractures. They happen after a fall on the buttocks and involve C1 if S5-C1 is ossified; otherwise, the lower extremity of the sacrum is involved. This is therefore a fracture affecting the last rigid bone. In general, they are visible on x-rays. They differ from osteoporosis fractures, which instead affect the middle part of the sacrum. Natural consolidation occurs within

three to four weeks. If the patient continues to suffer from pain beyond the normal consolidation period, an associated lesion is probably present that may appear on a dynamic imaging film [Fig 1].

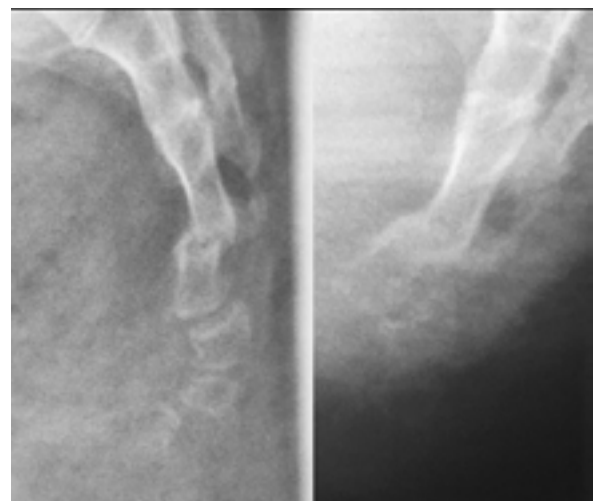


Figure 1. On the left, fracture to the lower extremity of the sacrum. On the right, same patient in seated position: complete posterior luxation of the coccyx.

Fractures to the first mobile bone of the coccyx

Fractures of the first mobile bone [Fig 2] occur after a fall (never childbirth). The mechanism of the fracture is that of a “nutcracker”, where the vertebra is squeezed between two handles, one formed by the lower extremity of the sacrum and the other formed by the distal vertebra, which is needed for the fracture to occur. This is known as a compression fracture. The line is not always well visible and is sometimes only seen on computed tomography (CT) [Fig 3]. Due to this poor visibility, diagnosis is not always confirmed and the outcome may develop towards pseudarthrosis.

If pain persists beyond one or two months, dynamic imaging is essential. It can show lack of consolidation with persistent mobility of fragments [Fig 4] or a marked associated instability [Fig 5]. In this case, surgery would be the only form of treatment.

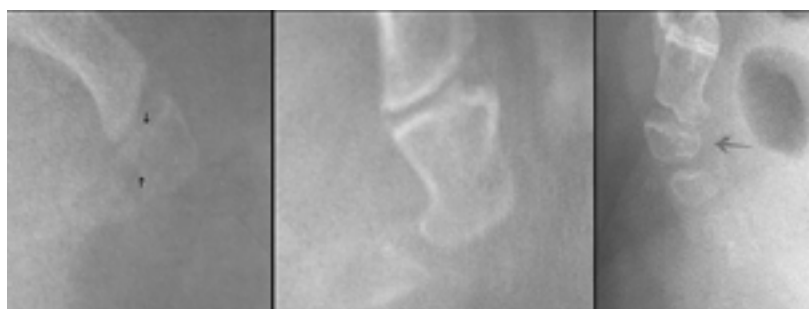


Figure 2. Three examples of a C1 fracture. In the middle, a slight tilt of the fractured fragment in clockwise direction. We notice that the fractured bone is still the first mobile bone of the coccyx, which consists of at least two bones.

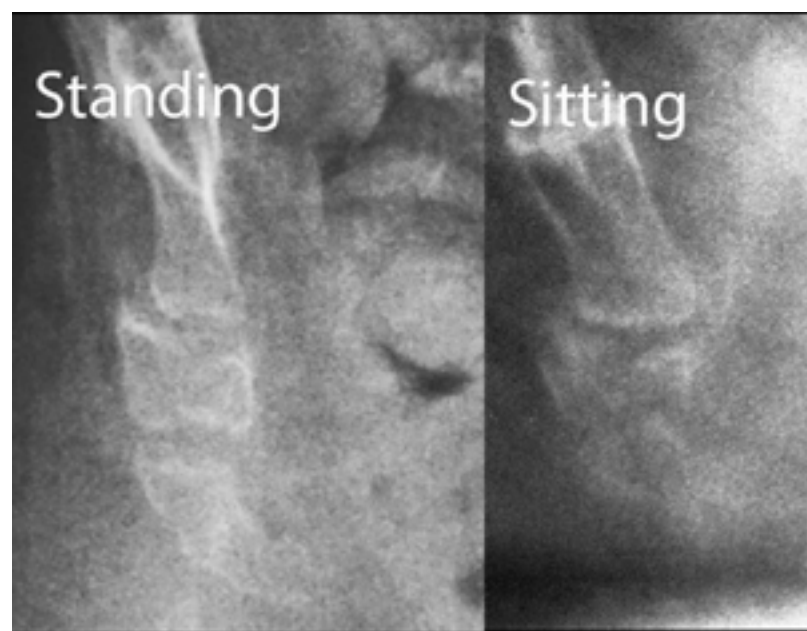


Figure 4. C1 fracture with pseudarthrosis visible in sitting position only: separate fragments.

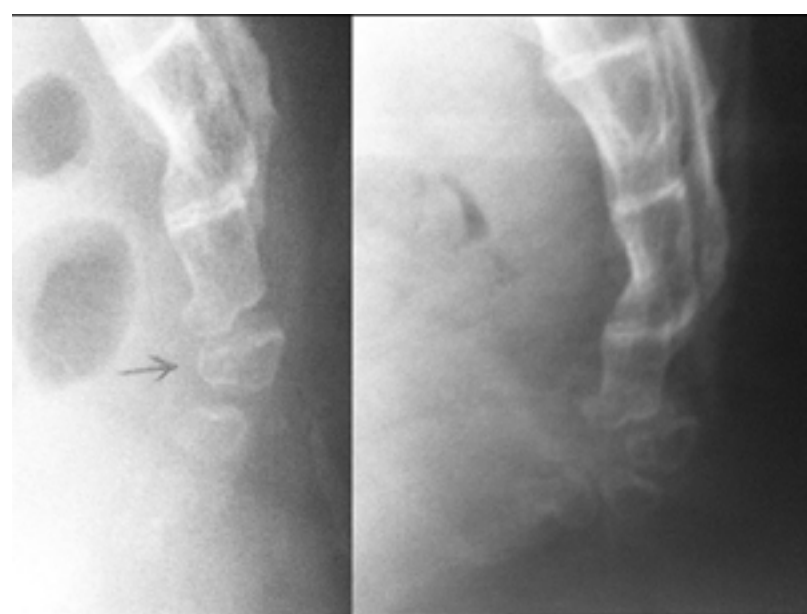


Figure 5. C1 fracture with vertical line associated with a posterior dislocation visible in sitting position (film on the right).

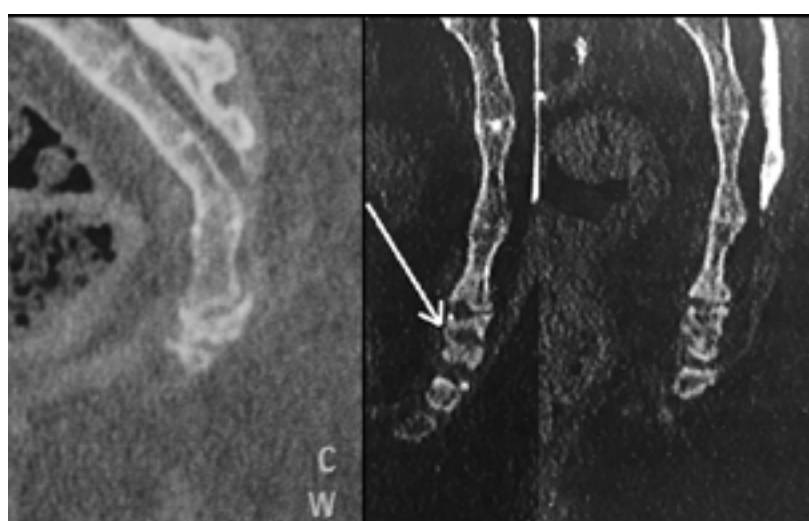


Figure 3. Two C1 fractures not visible on an x-ray, but only on a CT scan image.

Distal fractures of the coccyx

Distal fractures are generally the consequence of a difficult childbirth [Fig 6]. Their mechanism is therefore extension, related to the child passing through the birth canal. The use of forceps contributes to the risk [1]. It is likely that a majority of these fractures consolidate spontaneously, but some develop towards painful pseudarthrosis for which diagnosis can be difficult, as the pseudarthrosis focus may be confused with a normal disc on x-rays [Fig 7].

While we do not have any images prior to childbirth, these fractures appeared to concern rigid coccyges only, as is indicated by the common presence of a spicule, or a coccyx fused entirely with the sacrum, or retroversion which are just as much markers of coccygeal rigidity [Fig 8,9]. In case of persistent discomfort, surgery is the only treatment option.

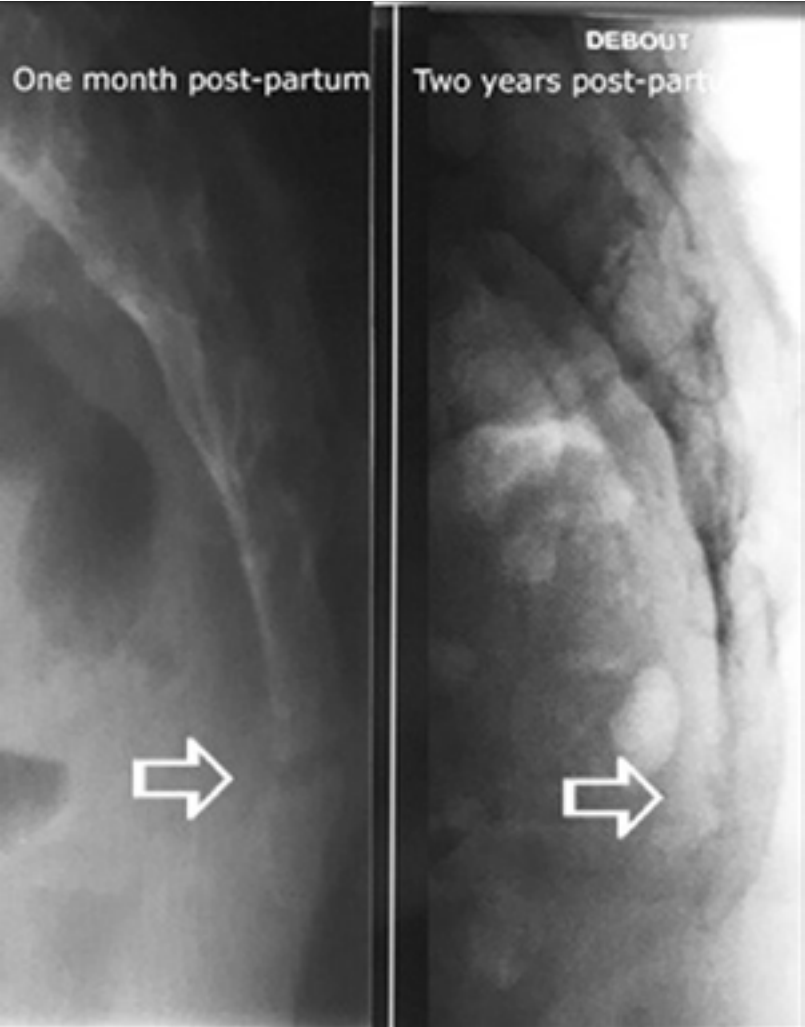


Figure 6. Post-partum fracture (arrow) with normal consolidation (images captured one month and one year after childbirth).

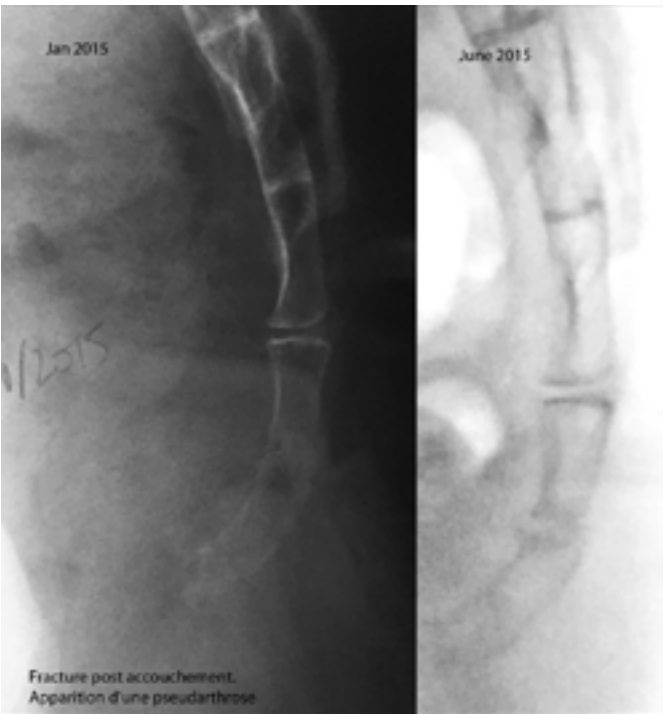


Figure 7. Post-partum fracture at 1 month: the line is slightly visible. On the right, six months later. Appearance of pseudarthrosis.

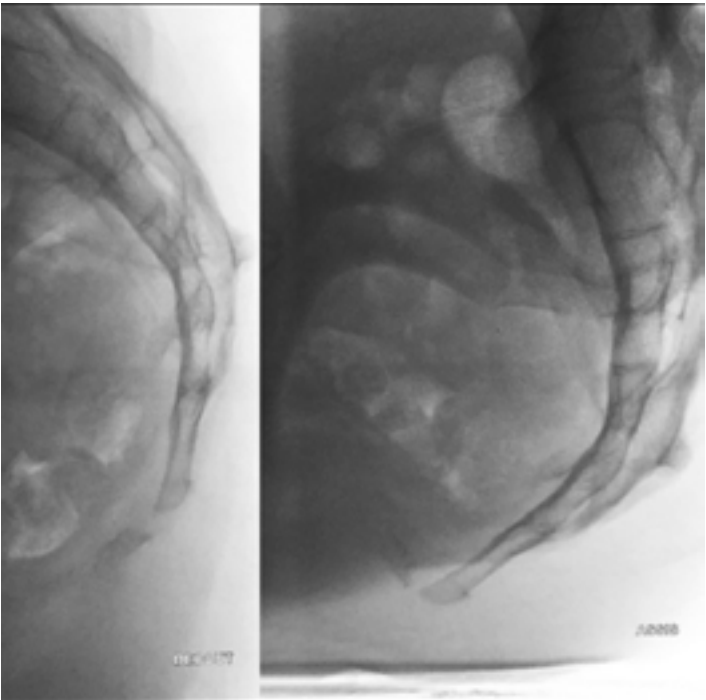


Figure 8. Post-partum fracture. Hypermobile pseudarthrosis on fully ossified coccyx, therefore primarily rigid. Note the spicule at the tip, which as a rule is only present on rigid coccyges.

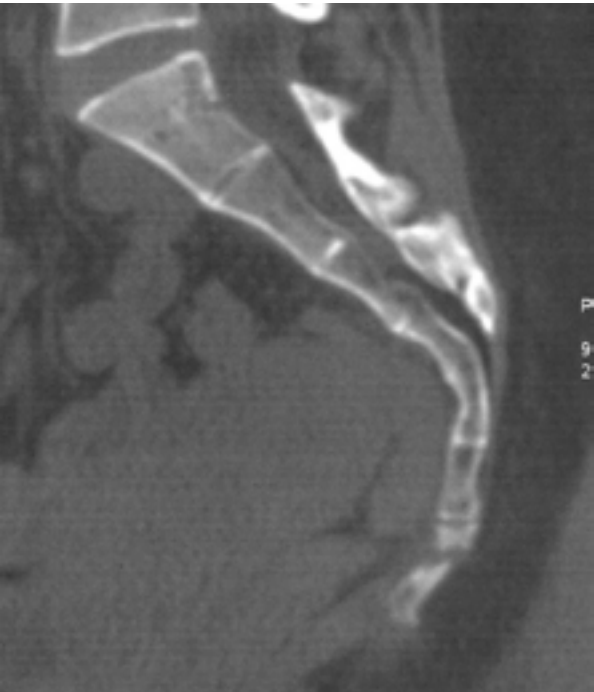


Figure 9. Post-partum pseudarthrosis. The presence of a sacrococcygeal joint is observed, but the fracture line is below, which indicates the lack of primary mobility of this coccyx. Note the small spicule, a common indicator of rigidity.

COCCYX CALCIFICATIONS

Our anatomical studies have shown that sacrococcygeal or intercoccygeal joints are discs, synovial type joints, or intermediary structures with a disc consisting of a cleft covered with synovial cells [2]. While we habitually refer to them as a disc, in this case, they are more likely synovial type joints.

The discovery of calcification in a coccygeal disc is not rare. However, few of them are actually symptomatic. We believe that there are two factors which must be present for coccygodynia to be reasonably attributed to the presence of calcification: specific clinical symptoms at the start of the attack and a specific radiologic aspect.

Clinical symptoms

Symptomatic calcifications are often the cause of specific clinical symptoms present in the first few days or weeks, but it subsequently lessens to become the symptoms of all chronic coccygodynias. It involves coccygeal pain of sudden onset, spontaneous and inflammatory in nature, which presents at night and in the day while standing, and worsens while sitting. These symptoms should be established by questioning the patient. The few cases that we have seen at this early stage benefited from oral steroids for 8–10 days with positive results that could be of diagnostic value. Gradually, pain levels then become that of all coccygodynias without any notable difference.

Radiologic aspect

We have been able to isolate certain imaging characteristics of symptomatic calcifications. The main characteristic is their partial or total spontaneous disappearance over time [Fig 10]. This is of course a retrospective argument, but it does confirm the fact that hydroxyapatite crystals are involved. A second characteristic is that the calcification is very likely non-symptomatic if the disc lacks mobility.



Figure 10. Disappearance of large calcification. X-ray images taken five years apart.

There are other arguments available to differentiate between a calcification of fortuitous presence, not responsible for symptoms, particularly on a mobile disc, and a symptomatic calcification responsible for pain:

The first is that symptomatic calcifications often get moulded into the joint space by filling it up completely [Fig 11]. The image is even more significant if the calcification is mobile, thereby changing shape when the patient moves from a standing to sitting position [Fig 12].

When the calcification does not take up the entire disc space, another significant aspect is its presence both in the ventral and dorsal part of the disc, which in fact probably corresponds to a toroidal calcification [Fig 13].

When the calcification does not take up the entire disc or when it is not toroidal, it becomes difficult to assess its role. It can be recognised for its size and the fact that it is located in the very anterior part of the joint [Fig 14].

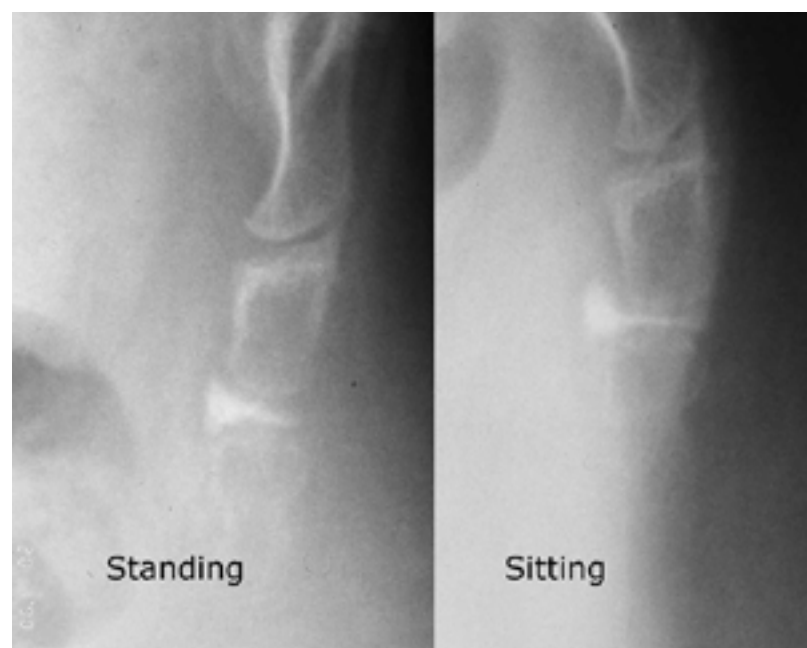


Figure 12. Soft calcification changing shape when moving from standing to sitting position.

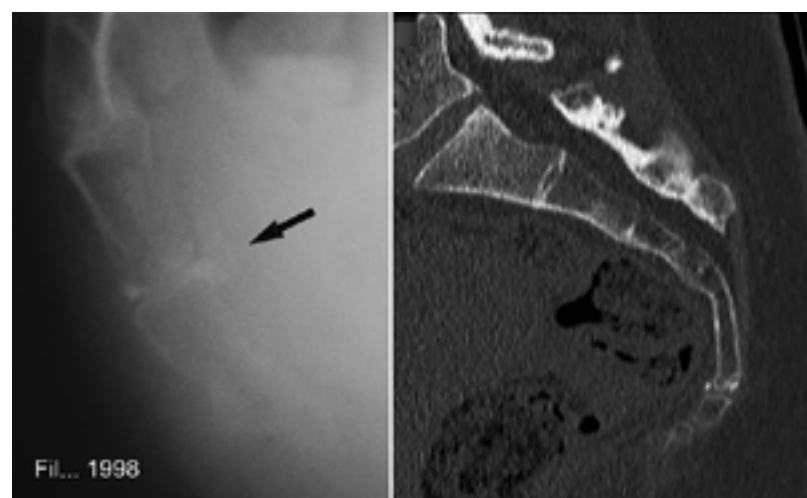


Figure 13. Appearance of ventral and dorsal calcification on x-ray and CT image. These are two different patients.

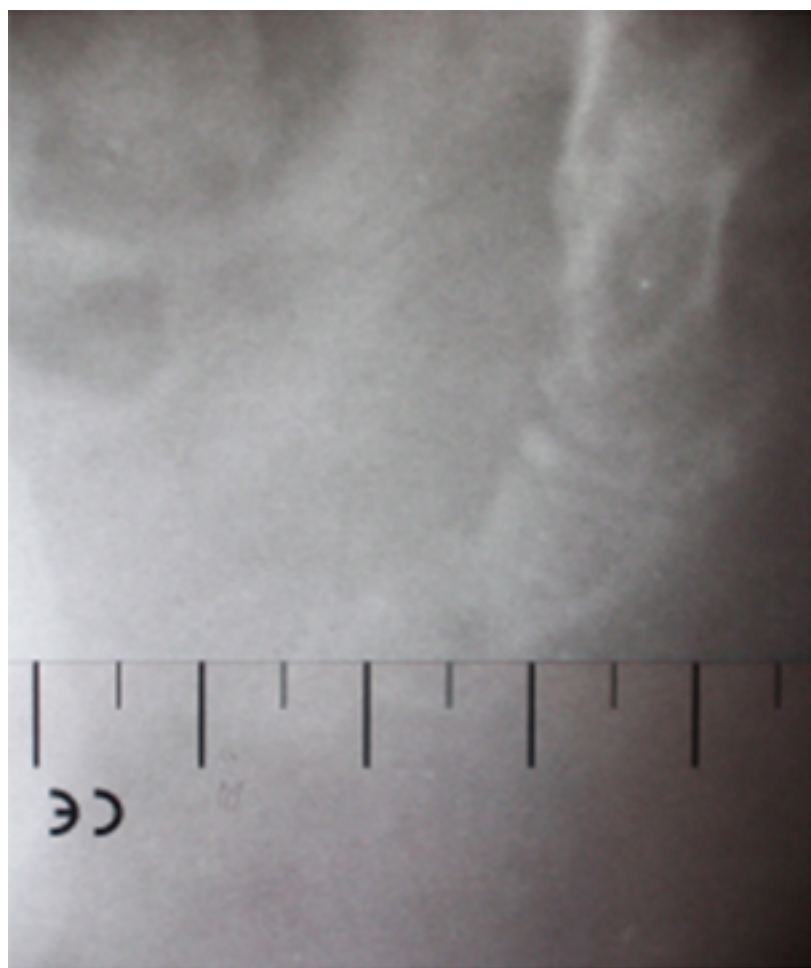


Figure 11. Calcification moulding the joint cavity.

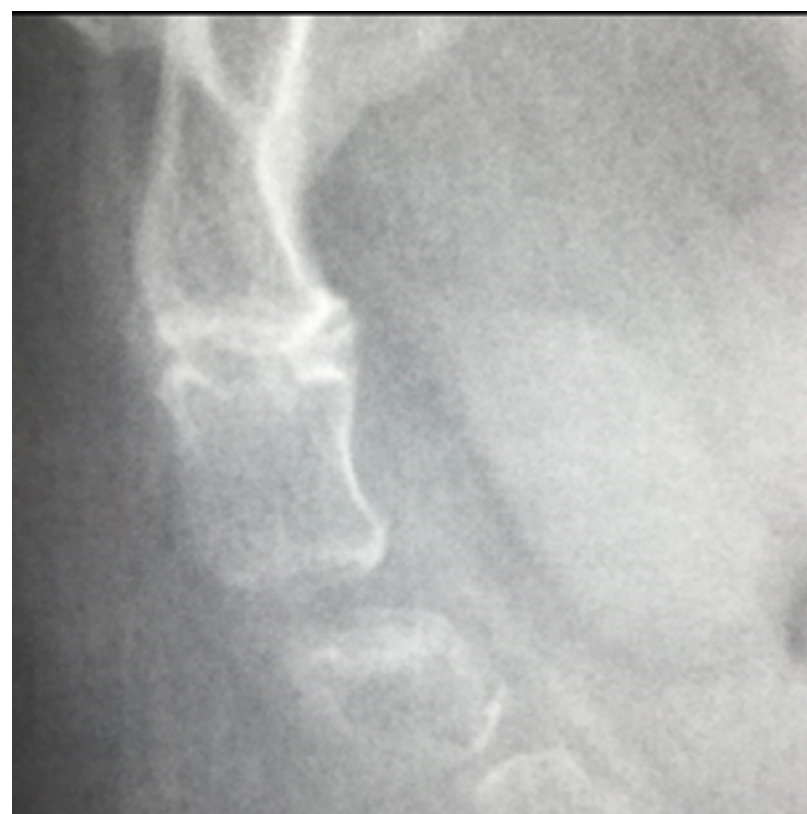


Figure 14. Thin calcification located on a non-mobile disc on the sitting film and hence, non-symptomatic. Hypermobility of the underlying segment was present in this case.

IMPINGEMENTS BETWEEN BONE AND SEAT SURFACE

In a few rare cases, namely young subjects and adolescents, the pain appears to originate from impingement between a highly protruding sacral extremity and the seat surface. Their sacrum is very specific. Instead of being forward concave, it is largely horizontal and backward concave, like a reverse curve. It creates a protrusion of the sacrum-coccyx angle under the skin, visible as a protuberance covered with keratinized and thickened skin [Fig 15,16].

Treatment is conservative. It consists of explaining the cause of the pain. It is possible that in adolescents, the curve will modify a little with growth owing to the plasticity of the skeleton. We recommend suitable seats (ones that are less painful for any given patient) and a cushion, and we ask that the patient increase the size of their buttocks as much as possible by working out the gluteal muscles. Although these measures appear sufficient, we must admit that we lack follow-up information in these patients. Only one case underwent surgery (Fig. 16, image on left) with resection of the bone protrusion yielding good results (Prof. L. Doursounian).



Figure 15. Three examples of bone-seat impingement due to protrusion of the sacrococcygeal angle.

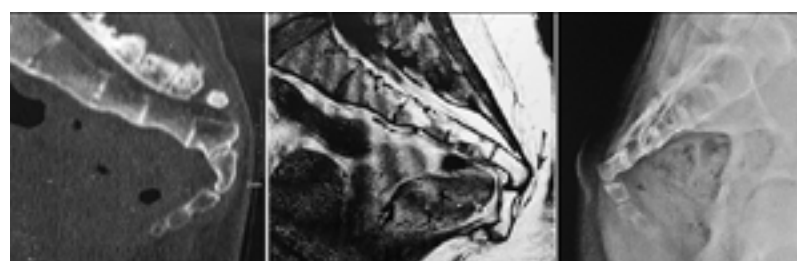


Figure 16. CT, MRI, and x-ray images of the three other cases, showing the concave appearance behind the sacrum and protrusion of the sacrococcygeal angle.

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