# Sacral Biopsy: Safe Working Channel by Tubular System

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**ABSTRACT**

There is no standardized protocol for sacral biopsies, the choice of method and technique depends on the surgeon based on their experience and diagnostic suspicion. Preoperative planning is necessary to preserve the approach site and reduce complications of the technique such as insufficient specimen, neurovascular damage, or tumor seeding. The aim of our work is to present our experience performing a sacral tumor biopsy with a minimally invasive technique using a tubular system. We present a 34-year-old female patient with suspected primary sacral tumor (mainly giant cell tumor and chordoma). The approach for a fluoroscopy-guided core needle biopsy was planned, and a safe working channel was created using a tubular system. **Conclusion:** Bone biopsy, assisted by a tubular system to create a safe channel, is an option to consider in the case of suspected tumors at risk of seeding.

**Keywords:** Bone biopsy; biopsy; fine needle; primary sacral tumor; seeding.
**Level of Evidence:** IV

## Biopsia de sacro: canal de trabajo seguro mediante un sistema tubular

**RESUMEN**

No existe un protocolo estandarizado para la toma de biopsias en el sacro. El cirujano, según su experiencia y la sospecha diagnóstica es quien elige el método y la técnica. Se necesita una planificación prequirúrgica para evitar comprometer el sitio de abordaje y disminuir las complicaciones de la técnica, como una muestra insuficiente, daño neurovascular o siembra tumoral. El objetivo de este artículo es comunicar nuestra experiencia en la toma de biopsia con una técnica mínimamente invasiva utilizando un sistema tubular en un tumor de sacro. Presentamos a una mujer de 34 años con sospecha de un tumor primario de sacro (tumor de células gigantes y cordoma principalmente), se planifica el abordaje y se crea un canal de trabajo seguro mediante un sistema tubular y se toman muestras con aguja gruesa guiada por radioscopia. **Conclusión:** La toma de biopsia ósea ayudada de un sistema tubular para crear un trayecto seguro es una alternativa para tener en cuenta ante la sospecha de tumores con riesgo de siembra.

**Palabras clave:** Biopsia ósea; biopsia con aguja fina; tumor sacro primario; siembra.
**Nivel de Evidencia:** IV

## INTRODUCTION

Bone tumors are diagnosed on the basis of a set of clinical data, imaging studies and histological analysis. Histological diagnosis requires the collection of samples, which can be performed openly or percutaneously, the latter including fine needle aspiration biopsies and core needle biopsies, which are the most commonly used for musculoskeletal tissue.[1]

The most common complications of biopsy collection include insufficient sample, tumor seeding in adjacent soft tissue, joint contamination, bleeding, neurological damage, and fractures.[2,3]

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As there is no standardized protocol for sacral biopsies, the choice of the method and site of entry, and the number of samples are left to the surgeon's decision, according to his experience and diagnostic suspicion based on clinical data and complementary studies. However, pre-surgical planning is necessary to obtain a sufficient sample, avoid compromising the site of a future surgical approach and reduce complications, mainly tumor seeding.

The aim of this article is to report our experience in taking a biopsy with a minimally invasive technique using a tubular system in a sacral tumor.

## CLINICAL CASE

A 34-year-old woman was referred to our Department in April 2023 by the Gastroenterology Department, where a pathological image in the sacrum had been detected in complementary studies, and she was being followed up for malaise that had progressed over a year and included weight loss, vomiting, and diarrhea.

On physical examination, she experienced incapacitating low back pain (visual analog scale 10/10), which persisted at night and did not respond to analgesics or position adjustments. Muscle strength and sensibility were preserved in all areas distal to the lesion, she had symmetrical tendon reflexes, with no pathological reflexes. Diuresis and catharsis were preserved.

Computed tomography showed a lytic image involving the entire sacrum, with bulging of the sacrum and thinned cortical bone, but without solution of continuity or invasion of adjacent tissues (Figure 1).

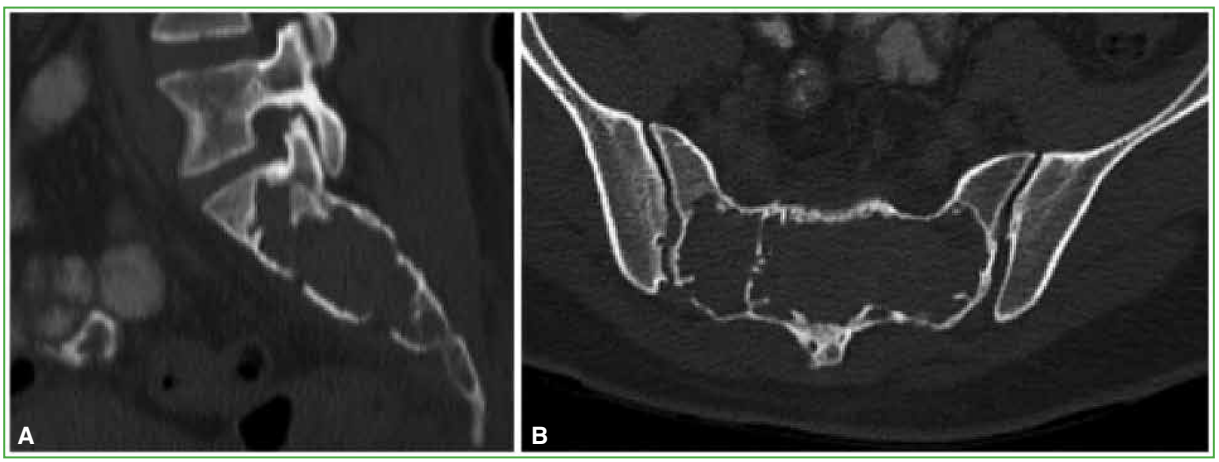


**Figure 1.** Sacral computed tomography, sagittal (**A**) and axial (**B**) slices. A lithic image is observed in the sacrum.

MRI revealed a lesion involving the sacrum diffusely, which was hypointense on the T1-weighted sequence (Figure 2A), with avid enhancement after injection of intravenous contrast medium (Figure 2B) and heterogeneous and hyperintense on T2-weighted and STIR sequences (Figure 2C and D).

Based on these data, a primary tumor was suspected, and the two main differential diagnoses were sacral chordoma and giant cell tumor. Chordoma is the most frequent primary sacral tumor and has some imaging characteristics similar to those of our patient, such as bone expansion, osteolysis and hypersignal in the T2 sequence; on the other hand, giant cell tumor is the most frequent benign tumor in that region, it is locally aggressive, and the patient's age and sex matched its epidemiology.

A biopsy was essential for an accurate diagnosis and, considering the high risk of local seeding of the chordoma, a core needle biopsy was chosen using a minimally invasive approach with a visual field of view delimited by a tubular system. We did not have protection for the needle, so the tubular system would provide us with a safe working channel to avoid seeding and insufficient samples, as well as the ability to obtain several bone samples from the same entry point guided by fluoroscopy.

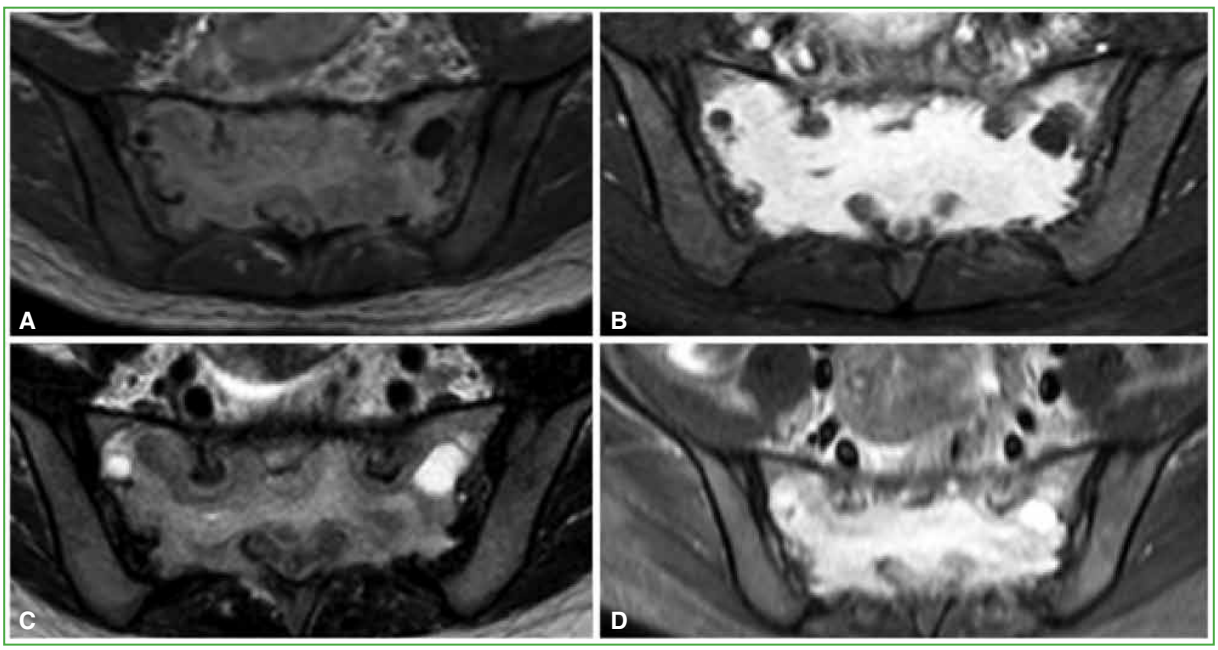


**Figure 2.** Magnetic resonance of the sacrum. The T1-weighted sequence shows a hypointense lesion that is diffusely involving the sacrum (**A**), with avid enhancement after injection of intravenous contrast medium (**B**). It is heterogeneous and hyperintense in T2-weighted (**C**) and STIR (**D**) sequences.

In planning the biopsy, the possible future surgery was taken into account, using an inverted Y approach as a guide. A 1.5 cm incision was made over a sector of the approach line (Figure 3A). Soft tissue dilators were used to create a safe working channel to the bone plane (Figure 3B). Four bone samples were obtained through the channel with a Jamshidi needle in different directions under fluoroscopic guidance (Figure 3C), using the same entry point. The wound was closed and the patient was discharged from the hospital the same day. The wound evolved without complications.

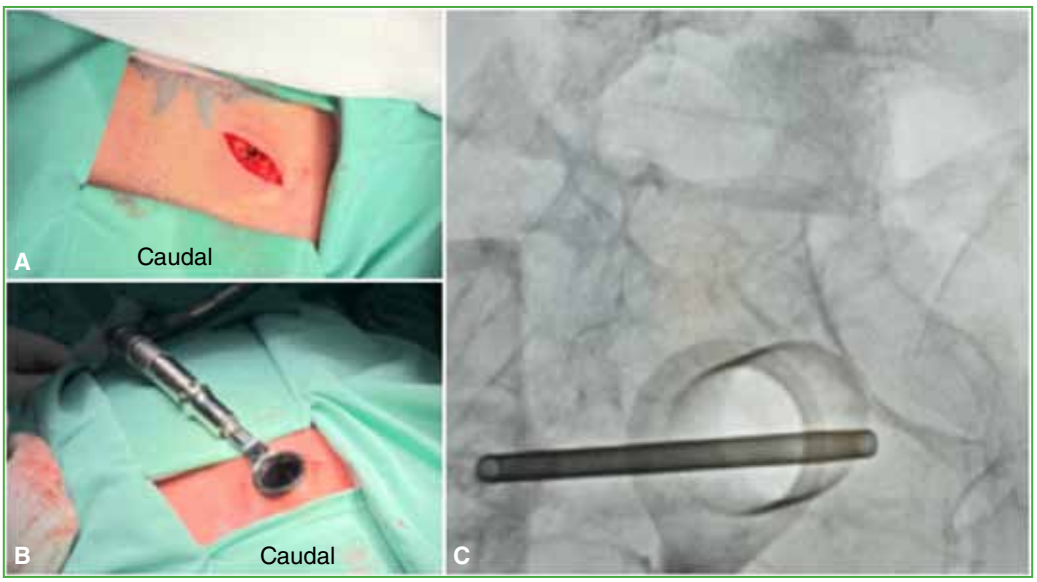


**Figure 3.** Intraoperative imaging. An inverted Y approach was planned and only a 1.5 cm incision was made (**A**). A tubular system (**B**) defines the field of vision and the safe working channel, and a fluoroscopy-guided core needle is used to collect samples (**C**).

One month later, the Pathology Service delivered the biopsy result, which reported a plasma cell neoplasm with lambda light chain restriction.

The patient was referred to the Oncohematology Department of our institution to receive the appropriate treatment.

## DISCUSSION

When a tumor is suspected, the main objective should be to provide a rapid and reliable diagnosis in order to plan treatment in a timely manner.[4]

Among the most commonly used methods in musculoskeletal tissue, core needle biopsy is more reliable than fine needle biopsy. It is often recommended because of the lower risk of complications, lower false negative rate, and lower cost, and shows no significant difference in the accuracy of incisional biopsy sampling.[5,6] However, the use of this method may result in a higher rate of repeat biopsies due to insufficient material and, if there is no adequate tissue, an open biopsy is recommended.[4]

Given the heterogeneity of musculoskeletal tumors, multiple samples are often necessary to obtain an accurate result. Assuming that the biopsy tract can be contaminated, the surgical incision site should be planned and the procedure should not disrupt other anatomical compartments or injure neurovascular structures.[6] In many articles, the risks of biopsy tract seeding are mentioned, but no recommendations on safe working channels are given. In our clinical case, the main differential diagnosis was sacral chordoma and, given the risk of seeding presented by these tumors,[3,7,8] biopsy collection was planned for a possible future inverted Y surgical approach.[9] A tubular system was used to delimit the visual field and a safe trajectory, and several samples were collected with a fluoroscopy-guided core needle from the same entry point.

In the literature, we found no other case report mentioning the use of this method. We recommend it for taking biopsies since it is simple, safe, and convenient, especially when a differential diagnosis may have a high seeding rate in the biopsy tract and no needle protection is available.

## CONCLUSIONS

The use of a tubular system could be considered a simple, convenient, and safe alternative to delimit the field of view and a safe path for bone sampling in order to avoid seeding and to obtain an adequate sample.

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Conflict of interest: The authors declare no conflicts of interest.

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