A Practical Access for fluoroscopically-guided percutaneous sacroplasty: Case Report

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CASE REPORT

A practical access for fluoroscopically-guided percutaneous sacroplasty: Case report

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Abstract

Background: Sacral metastases represent the lowest percentage of invasion to the spine, however, as chemotherapy treatments progress, the cancer survival rate has become higher, and the percentage of sacral metastases has increased. Treatment options for sacrum metastases are surgery, radiotherapy, and minimally invasive techniques such as sacroplasty and radiofrequency ablation. Knowing the repercussions that advancing the needle anteriorly (viscera) or medially (sacral roots) can have during the sacroplasty we are describing a technique to perform c-arm sacroplasty in coaxial vision, to identify the anterior sacral cortical bone that is in the limits of the pelvic viscera as well as the sacral foraminal line.

Case presentation: In the current report, we present a 75-year-old male patient with prostate cancer metastatic to S1, S2, S3 and iliac, with severe lumbar axial pain VAS 8/10. With a caudal tilt between 35-45 degrees until aligning the sacrum in a coaxial view, a 11-gauge Jamshidi needle is advanced from s3 to s1. The trajectory of the needle during the procedure is corroborated in AP and lateral, S1 is cemented, and the needle is withdrawn to cement S2 and S3. After the sacroplasty with the coaxial access, the patient reported VAS 1-2/10.

Conclusions: It is important to offer an adequate quality of life to patients with sacral fractures, whether associated with cancer or sacral insufficiency fractures (SIF). Sacroplasty, being a recently described technique, can be a very viable option for these patients, that's why it is important to have safe and reliable techniques to complement the approach of this minimally invasive technique.The coaxial access may be a safe and practical way to perform sacroplasty in these patients.

KEYWORDS
cancer, neoplasm, refractory pain, vertebral compression

INTRODUCTION

Sacral metastases represent the lowest percentage of invasion to the spine; however, as chemotherapy treatments progress, the cancer survival rate has become higher, and the percentage of sacral metastases has increased. Since the sacral anatomy is different from the rest of the vertebrae, a different access is required to reach the target. On the other hand, the incidence of sacral insufficiency fractures (SIF) tends to increase due to growth in life expectancy,[1] with an overall 1-year mortality rate of ~14%.[2]

Treatment options for sacrum metastases are surgery, radiotherapy, and minimally invasive techniques such as sacroplasty and radiofrequency ablation. The conservative treatment for sacral fractures consists of rest, pain medication, and physical therapy; however, these are generally prolonged treatments and surgical treatments are usually limited due to bone weakness associated with osteoporosis or metastatic lesions.

Sacroplasty is known to have positive long-term outcomes and an excellent success rate for SIF, and there is evidence of immediate and sustained pain relief after sacroplasty in sacral metastases.[3,4]

Nowadays needle-insertion techniques for sacroplasty include the transiliac (lateral approach under CT or fluoroscopic guidance), long-axis, and short-axis approaches.[5]

Knowing the repercussions that advancing the needle anteriorly (viscera) or medially (sacral roots) can have, it is described to use a biplane fluoroscope to control the direction of the needle both in AP and lateral or under CT guidance. CT-guided sacroplasty allows to visualize the trajectory of the needle into the sacrum and a good visualization of the osseous boundaries and the fracture zones. With the fluoroscopy technique, the patient is not exposed to high doses of radiation, another advantage of the fluoroscopy technique is that the cement can be injected under live fluoroscopy, and it is faster to perform.[6,7]

Based on this, we are describing a technique to perform c-arm sacroplasty in coaxial vision.

Silva recently described a technique to access the sacral hiatus in coaxial vision with a caudal inclination of 45–55 degrees; this same projection works to visualize the sacral trajectory in its extension for the longitudinal approach.[8]

It is a safe projection since it can identify the anterior sacral cortical bone that is in the limits of the pelvic viscera and the sacral foraminal line (two of the limits that are considered for the access of sacroplasty). The intention of this new technique description is to make it easier and safer, whether the intention is to cement or take a biopsy.

We present a 75-year-old male patient with prostate cancer metastatic to S1, S2, S3, and iliac, with severe lumbar axial pain VAS 8/10. Pharmacological treatment including pregabalin 150 mg/day and tramadol 200 mg/day was ineffective and experienced intolerable side effects. He came to the consultation in a wheelchair, not being able to walk due to intense axial pain.

He was offered a fluoroscopically-guided percutaneous sacroplasty procedure in order to achieve better pain control and stability in the affected area. The patient provided permission for the presentation of this report. Institutional review board approval was waived for this case report.

TECHNIQUE DESCRIPTION

After informed consent was gained, the patient was positioned supine with a pillow under the pelvis to elevate the sacrum angle. Standard monitoring, such as electrocardiography, noninvasive blood pressure monitoring, and pulse oximetry, was in place. After O_2 was administered via a nasal prong, 2 mg midazolam IV and 100 mcg fentanyl IV were administered for sedation. After the skin was prepared with chlorhexidine, in AP with approximately 15 degrees cephalad tilt, we identify the lateral border of S1 and place a 22G spinal needle in this area, thus locating our lateral limit of the foramen, then, the fluoroscope is set with caudad tilt between 35 and 45° up to align the anterior and dorsal aspect of the sacrum, which would give us a coaxial view of the sacral bone.

We marked the entry point between the sacral foramina and the sacroiliac joint line and injected local anesthesia using 3 ml of lidocaine 1% with a 25-gauge needle. After that, we inserted a 22-gauge quincke needle as a reference to obtain the correct trajectory of the needle, and then, a 11-gauge Jamshidi needle is advanced from s3 to s1. The trajectory of the needle during the procedure is corroborated in AP and Lateral, s1 is cemented, and the needle is withdrawn to cement s2 and s3 (Figures 1–4).

The patient was taken to the recovery room and remained neurologically and cardiovascular intact with no deficits reported. The patient was followed up at 1, 3, and 6 months.

The day after the procedure, the patient reported an improvement in pain (VAS 8/10 to 3/10), he was able to walk short distances with the support of the nursing staff. A month after the procedure, he reported VAS 1–2/10 and began physical therapy, improving ambulation, tolerating moderate to long distances walking, and reducing his medication to pregabalin 75 mg at night, at 3 and 6 months the improvement was maintained.

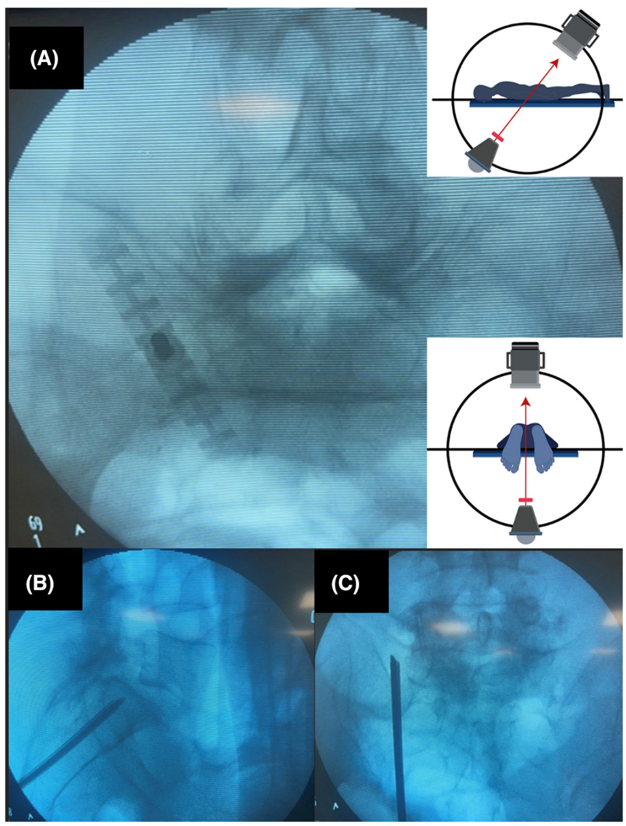

FIGURE 1 (A) Needle in coaxial view with the schematic illustration of the c-arm projection with caudad tilt. This first step allows us to visualize the sacrum in its antero-posterior portion, identifying the visceral area. (B) Needle trajectory in lateral projection. (C) Needle trajectory in AP projection. This lets us corroborate the needle position.

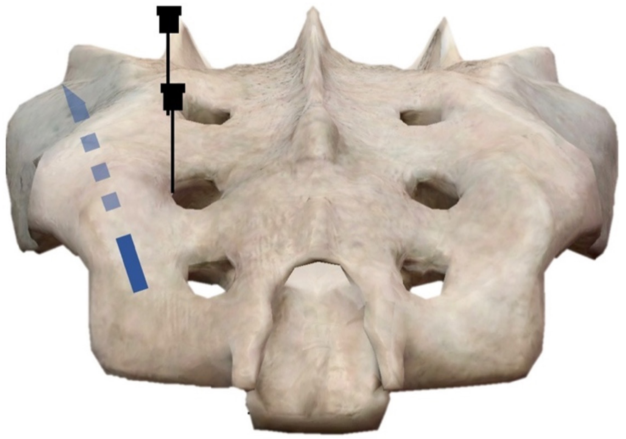

FIGURE 2 Caudad tilt. Blue: Jamshidi needle, the continuous line represents the portion of the needle outside the bone; the dotted line represents the needle once that it is inside the bone. Black: Two 22-gauge spinal needles on the lateral border of S1 and S2

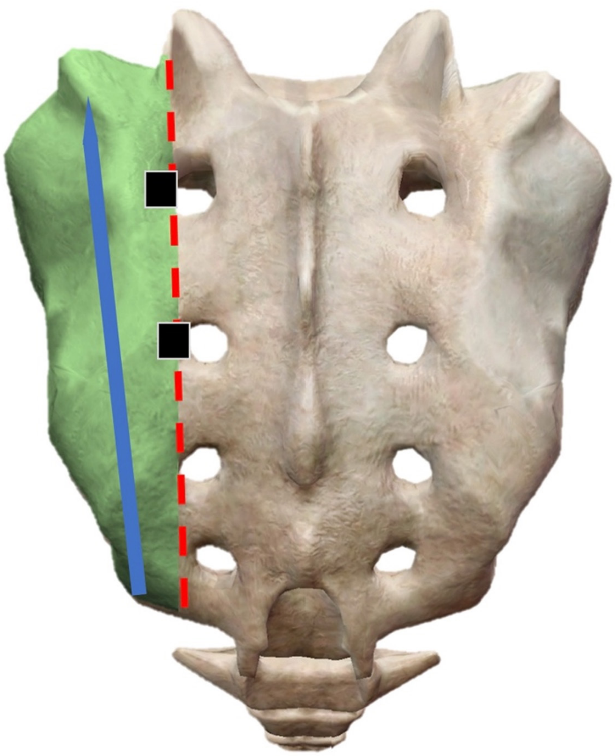

FIGURE 3 AP: Green area: Safe zone for cement injection (PMMA). Blue: Trajectory of the Jamshidi needle. Black squares: 22-gauge spinal needle in the lateral border of S1 and S2. Red lines: Lateral boundary of the sacral foramen

DISCUSSION

Vertebroplasty was introduced in 1984 by Galibert,[9] since then many procedures have been performed for both osteoporotic and cancer-related vertebral fractures. Nowadays, percutaneous cement injection has been described for almost all types of bone.[10]

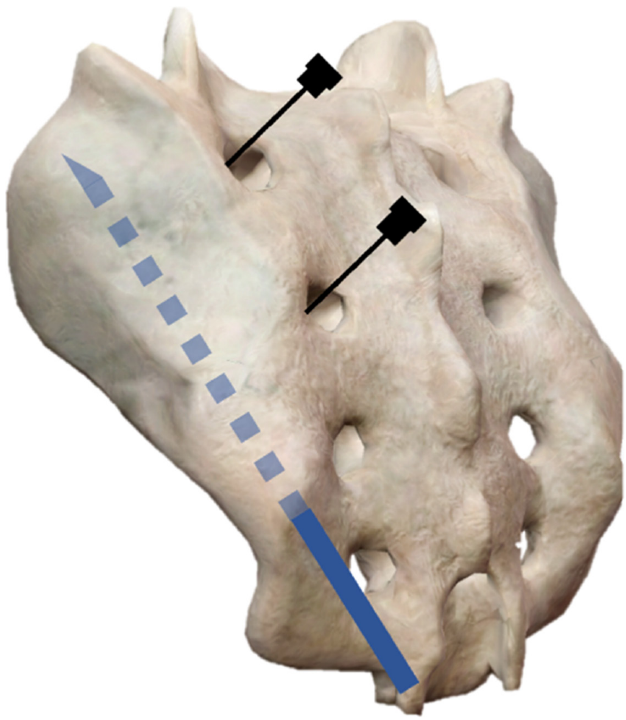

FIGURE 4 Oblique view of the sacrum. Blue line: Trajectory of the Jamshidi needle. Black lines: 22-gauge spinal needles in the lateral border of S1 and S2 foramen

The most frequent complication in sacroplasty is cement leakage, which can occur in up to half of the cases, with a high frequency; fortunately, in most cases, it does not have major clinical repercussions. It is described to inject a low volume of polymethyl methacrylate (1–2 ml) with favorable outcomes. An important parameter that indicates when to stop injecting is that the PMMA is leaking towards the sacral foramina.[11]

The close relationship between the cement injection and the sacral foramina can make this technique difficult, which is why several authors prefer to initially place the needle with CT guidance and then with fluoroscopy at the time of injecting the cement, due to this, we believe that the technique that we are describing has great value in both initially positioning the needle and injecting the cement without the need to rely on CT.

CONCLUSION

It is important to offer an adequate quality of life to patients with sacral fractures, whether associated with cancer or SIF. Since instability is one of the complications of sacral metastases, it is important to stabilize the area by injecting polymethyl methacrylate. Sacroplasty, being a recently described technique, can be a very viable option for these patients, that's why it is important to have safe and reliable techniques to complement the approach of this minimally invasive technique.

ACKNOWLEDGMENTS

Luz Andrea Ramirez-Quintana, MD: Schematic drawings of Figures 2–4.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The studies and data that support the findings of this study are available in PubMed, central, web of science.

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REFERENCES

1. Mika A, Mesfin A. Update on the management of sacral metastases. JBJS Rev. 2018;6(7):e8. https://doi.org/10.2106/JBJS.RVW.17.00130. PMID: 30044246.
2. Eichler K, Zangos S, Mack MG, Marzi I, Vogl TJ. Outcome of long-axis percutaneous sacroplasty for the treatment of sacral insufficiency fractures with a radiofrequency-induced, high-viscosity bone cement. Skeletal Radiol. 2014;43(4):493–8. https://doi.org/10.1007/s00256-013-1811-4. Epub 2014 Jan 23. PMID: 24453025.
3. Lee J, Lee E, Lee JW, Kang Y, Ahn JM, Kang HS. Percutaneous sacroplasty: effectiveness and long-term outcome predictors. J Korean Neurosurg Soc. 2020;63(6):747–56. https://doi.org/10.3340/jkns.2020.0014. Epub 2020 May 27. PMID: 32455518; PMCID: PMC7671780.
4. Tarawneh AM, Sabou S, AlKalbani S, Pasku D, Quraishi NA. Clinical outcomes of sacroplasty for metastatic sacral tumours: a systematic review and meta-analysis. Eur Spine J. 2020;29(12):3116–22. https://doi.org/10.1007/s00586-020-06562-w. Epub 2020 Aug 9. PMID: 32772170.
5. Kao FC, Hsu YC, Chen TS, Liu PH, Tu YK. Combination of long- and short-axis alar sacroplasty techniques under fluoroscopic guidance for osteoporotic sacral insufficiency fracture. J Orthop Surg Res. 2021;16(1):269. https://doi.org/10.1186/s13018-021-02409-2. PMID: 33865421; PMCID: PMC8052704.
6. Nicholson PJ, Hilditch CA, Brinjikji W, Tsang ACO, Smith R. Single-needle lateral sacroplasty technique. AJNR Am J Neuroradiol. 2019;40(2):382–5. https://doi.org/10.3174/ajnr.A5884. Epub 2018 Nov 15. PMID: 30442694; PMCID: PMC7028625.
7. Tian QH, Liu HF, Wang T, Wu CG, Cheng YS. Fluoroscopy-guided percutaneous sacroplasty for painful metastases at the sacral ala. J Pain Res. 2020;13:151–6. https://doi.org/10.2147/JPR.S193866. PMID: 32021404; PMCID: PMC6970629.
8. Silva-Ortiz VM. Imaging optimization for fluoroscopically guided caudal epidural coaxial view. Interventional Pain Medicine. 2022;1(2):100080, ISSN 2772-5944. https://doi.org/10.1016/j.inpm.2022.100080
9. Galibert P, Deramond H, Rosat P, Le Gars D. Note préliminaire Sur le traitement des angiomes vertébraux par vertébroplastie acrylique percutanée [preliminary note on the treatment of vertebral angioma by percutaneous acrylic vertebroplasty]. Neurochirurgie. 1987;33(2):166–8. French PMID: 3600949.
10. Kim WS, Kim KH. Percutaneous osteoplasty for painful bony lesions: a technical survey. Korean J Pain. 2021;34(4):375–93. https://doi.org/10.3344/kjp.2021.34.4.375. PMID: 34593656; PMCID: PMC8494954.
11. Heo DH, Park CK. Percutaneous sacroplasty for non-neoplastic osteoporotic sacral insufficiency fractures. Pain Physician. 2017;20(2):89–94. PMID: 28158156.

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