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## Case Report

# Percutaneous Cryoneurolysis: An Alternative in Metastatic Bone Lesion Involving Sacroiliac Joint

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## Abstract

Cryoneurolysis is a very recent and advanced procedure in interventional pain management practice. Application of cold allows second-degree nerve injury resulting in analgesia. Here, we are presenting a case of effective pain relief by cryoneurolysis of the lateral branches for the right sacroiliac joint in a patient suffering from hepatocellular carcinoma with bone metastasis.

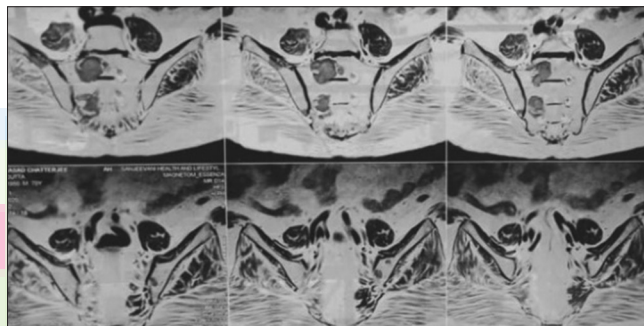
**Keywords:** Cryoneurolysis, cryoprobe, percutaneous cryoneurolysis, sacroiliac joint pain

## INTRODUCTION

Cryoneurolysis is an advanced technique in chronic pain management. Radiofrequency ablation is also being performed but the degree of nerve damage is more with this technique than with Cryoneurolysis. Thus, we performed Cryoneurolysis of Sacroiliac (SI) joint in a patient with low back pain with bony metastatic lesions over sacrum and SI joint.

## CASE REPORT

A 69-year-old male patient visited our outpatient department (OPD) on June 4, 2020, with a complaint of sudden onset of low back pain radiating from the medial aspect of the right gluteal fold to the posterior-medial aspect of the thigh but not beyond the knee joint since the last 1 month, the severity of which increased by 1 week. On entering the OPD room, he was energetic with antalgic gait and was walking without support. While sitting, he was tilted toward the left side raising his right buttock up from the chair because of pain. He had not experienced any radiating pain from the upper part of the buttock or around the waist. It was constant and deep aching pain. The pain increased at night and was more in sitting than standing or walking whereas it decreased when lying on the left lateral position. The Numerical Rating Scale Score was 6 out of 10 which became 9 when severe. The Pain Detect Tool Score was 3, and the Patient Health Questionnaire-9 Score was 2. He has a history of hepatocellular carcinoma diagnosed 1 year



**Figure 1:** Magnetic resonance imaging scan showing metastasis

back. The available image showed sacral vertebral metastasis with lesion around the right sacroiliac (SI) joint [Figure 1].

He had 5 cycles of nivolumab, last one given on November 2019 and now on zoledronic acid infusion as advised. He was on regular consultation with a medical oncologist who

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has prescribed him gabapentin and other analgesics such as paracetamol, nonsteroidal anti-inflammatory drugs, and tapentadol. He was given tramadol but that resulted in itching, and thus, it was stopped. Three days earlier, an oral morphine tablet was added for increasing pain severity, but the patient was experiencing tightness of the chest, after which he did not take it.

On examination, on deep palpation of the medial aspect of the right gluteal fold and the mid-posterior thigh below it, tenderness was present. There was no tenderness over the lower lumbar facets, bilateral SI joint, and over the piriformis. Reflexes of lower limbs and neurological examination were normal. FABER (Flexion Abduction External Rotation), FAIR (Flexion Adduction Internal Rotation) and SLR (Straight Leg Raise) tests all were negative bilaterally.

Our provisional diagnosis was chronic cancer pain due to bone metastasis around the right SI joint.

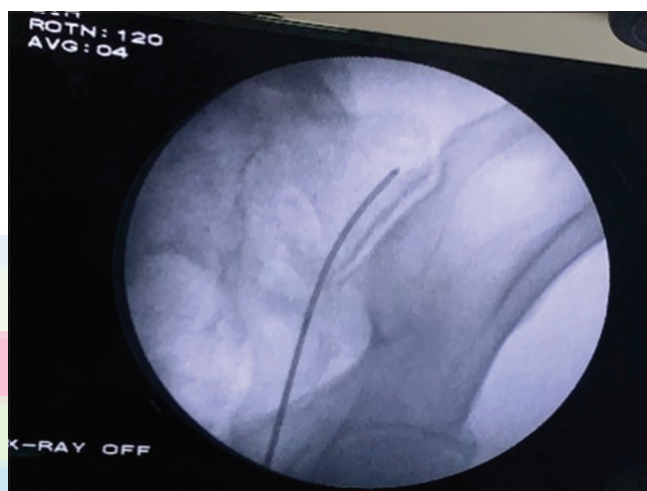
Counseling was done regarding cancer and bone metastatic pain. The patient was given the first pain relief treatment option as intrathecal pump placement and the second being a diagnostic intervention to rule out pain generator is from SI joint pathology. As the intrathecal pump is expensive and not affordable, the patient agreed to the second option. We elaborately discussed with the patient's son for possible diffuse and undefined spread of malignancy over the course of time which may lead to the recurrence of pain shortly after intervention too. Contraindications for the intervention were also looked for.

On June 16, 2020, the patient visited for diagnostic intervention. The procedure was explained, and written informed consent was taken. On prone position with aseptic precautions, the part was painted and draped. Under fluoroscopy guidance, 1% plain lignocaine injection was infiltrated to the skin at the needle entry site targeting the lower part of the right SI joint. A 22G spinal needle was used, and the spread pattern of diluted contrast iohexol was confirmed. Then, preservative free 3 ml of 1% lignocaine was injected intra-articularly. Extend of pain reduction was assessed after 5 and 10 min of intra-articular injection. Reduction in pain was by around 60% and more than 80%, respectively, as informed by the patient. We then confirmed that the pain generator was right SI joint pathology. We then suggested cryoneurolysis of the lateral branches of the SI joint.

Cryoneurolysis was performed following the hospital protocol on June 18, 2020. Under fluoroscopy guidance, the needle entry point was identified just medial to the lower part of the right SI joint. 2% 2 ml of lignocaine was infiltrated on the skin and subcutaneous tissue. 14G curve tip cryoprobe was inserted contacting with the sacrum, parallel and near to the right SI joint [Figures 2 and 3]. Cryoprobe was then connected to the cryoneurolysis machine [Figure 4], and carbon dioxide gas was used to create cold lesion. Cryoneurolysis was done with 2 cycles of freezing at a temperature of  $-78^{\circ}\text{C}$  for 3 min



**Figure 2:** Cryoprobe in position



**Figure 3:** Fluoroscopic view of cryoprobe



**Figure 4:** Metrum Cryoflex device

and defrosting for 1 min. After the first cycle, the probe was slightly manipulated to increase the area of cryoneurolysis. At the end, cryoprobe was removed and the skin was covered with the medicated tape. The patient informed about more



than 80% reduction in pain while shifting from the procedure room. Post procedure, the patient was observed for 1 h and discharged.

No complications of SI joint injection such as infection, trauma to the sciatic nerve, and other complications related to drug administration were observed. On telephonic conversation just before submitting this report, he informed a NRS score of 2–3 on most of the days and occasionally 4, for which he used to take 1 g paracetamol on a need basis.

## DISCUSSION

SI joint is a weight-bearing synovial joint. Its nerve supply is complex. Contribution to supply SI joint may be from the fourth lumbar up to the fourth sacral spinal nerve. The first and second sacral nerves innervate in all, whereas the third sacral nerves innervate in 88%. Branches from the fifth lumbar and fourth sacral nerves also innervate in few percentage of population. The fibers of the SI joint capsule blend anteriorly and posteriorly with numerous ligaments. It has a uniformed and well-formed anterior capsule. The posterior capsule often has tears and vents.<sup>[1]</sup> Anterior and posterior SI ligaments, iliolumbar ligament, interosseous ligament, sacrotuberous ligament, and sacrospinous ligament play their role with SI joint capsule and its function.<sup>[2]</sup>

SI joint pain compromises 15%–30% of low back pain. One of the reasons for wide variations of referral pain patterns from the SI joint may be its complex nerve innervation or the site of injury at the joint itself. Ligaments, facet joints, intervertebral discs, and piriformis may be the site for primary nociceptors. Involvement of L5 nerve root or sciatic nerve may also have a contribution.<sup>[3,4]</sup>

Usually, the pattern of SI joint pain is around the lateral aspect of the upper part of the buttock up to the posterior thigh. However, in our patient, the pain started from the medial aspect of the gluteal fold. SI joints were nontender even on deep palpation with negative FABER test. As a cancer patient with bony metastasis and lytic lesion in the SI joint on an image, we hesitated to examine other provocative tests for SI joint pain. Thus, pain during sitting position and the bony lesion over that area was only the clue to think SI joint as a pain generator in this patient. Till the 1990s, the objective evidence for SI joint as a pain generator was unavailable, and before that, it was almost neglected as a cause for low back pain.<sup>[2]</sup>

Although oral morphine is the drug of choice in a cancer pain patient, the patient was not tolerating and was suffering from pain too. Thus, we thought of diagnostic intervention followed by cryoneurolysis.

Application of cold to the tissues resulted in local anesthetic like conduction block and is called cryoanalgesia. This method is used to treat the pain from craniofacial, abdominal, pelvic and chest wall neuralgias and neuromas, postherpetic

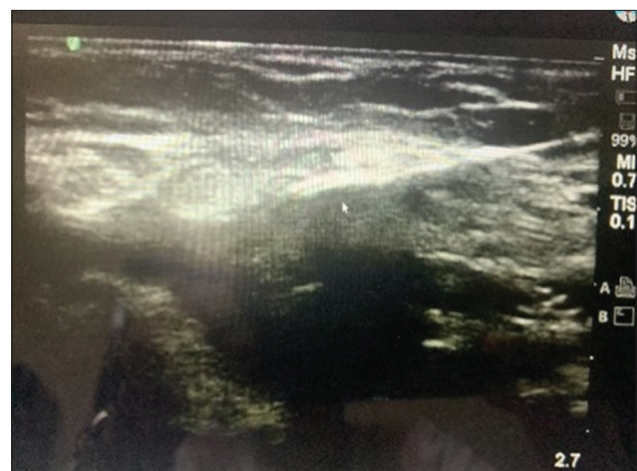
neuralgia, low back and lower extremity pain from lumbar facets and SI joint pathology, and pain due to pseudo-sciatica or various peripheral neuropathy and neuritis. Recently, an excellent result was reported with cryoneurolysis done for scar neuralgia after abdominal hysterectomy.<sup>[5]</sup> It has a cycle of freezing and defrosting. During nerve freezing, ice crystals formed and damage the vasonervorum resulting in severe endoneurial edema.<sup>[6]</sup> Unlike radiofrequency (RF) ablation, in cryoneurolysis, Schwann cell basal lamina, myelin sheath, and endoneurium remain intact. This favors nerve regeneration without neuroma formation. Furthermore, motor nerve if involved in this technique will recover early within 1–2 months. Sydney Sunderland's second-degree nerve injury, axonotmesis, is the ultimate goal to achieve in cryoneurolysis.<sup>[7]</sup> In addition to the damaging vasonervorum, the prolonged effect of cryoneurolysis is also explained by released sequestered proteins causing autoimmune response to the lesioned tissues.<sup>[1,8,9]</sup>

For this metastatic lesion, RF ablation was not our choice as innervation and course of nerves may not be like in other pathology. We wanted a big size of lesion to cover wide area with a single skin prick. Thus, we used a 14G cryoprobe to create a lesion length of 8.2 cm. The lesion size was increased by manipulating the probe below for approximately 1 inch and created another lesion. Ultrasound was used to see the ice-ball formation during freezing under which formation of acoustic shadow was seen [Figure 5].

SI joint fusion and neuroaugmentation are also the treatment options for SI joint pain, but the technique is more sophisticated, not easily available, and may not be possible in a malignant lesion of the SI joint.

## CONCLUSION

Percutaneous cryoneurolysis is easy to perform, and chances of neuroma formation and de-afferentiation pain are almost nil. In a cancer patient with metastatic lesion around the SI joint, where there is a limitation of other intervention techniques



**Figure 5:** Ice-ball formation

such as chemical neurolysis, RF ablation or nontolerance to strong oral opioid analgesic, and not affording intrathecal pump placement, such simple percutaneous cryoneurolysis under fluoroscopy and ultrasound guidance may be a better alternative.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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