

# Traumatic Left Posterior Sternoclavicular Joint Dislocation with Figure of 8 Semitendinosus Ligament Reconstruction

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*Received: 25 August 2023*

*Accepted: 26 October 2023*

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DOI 10.5001/omj.2026.02

## Abstract

Sternoclavicular joint dislocation (SCJD) is a rare injury, accounting for less than 1% of all dislocations. Posterior SCJD poses life-threatening risks due to its proximity to vital structures. We present a case of a 21-year-old male with traumatic left posterior SCJD from a motor vehicle accident. Closed reduction failed, leading to open reduction and a figure of 8 reconstruction using the semitendinosus tendon as an autograft. Postoperative CT confirmed successful joint stability. Prompt and tailored management is crucial in addressing such rare injuries effectively.

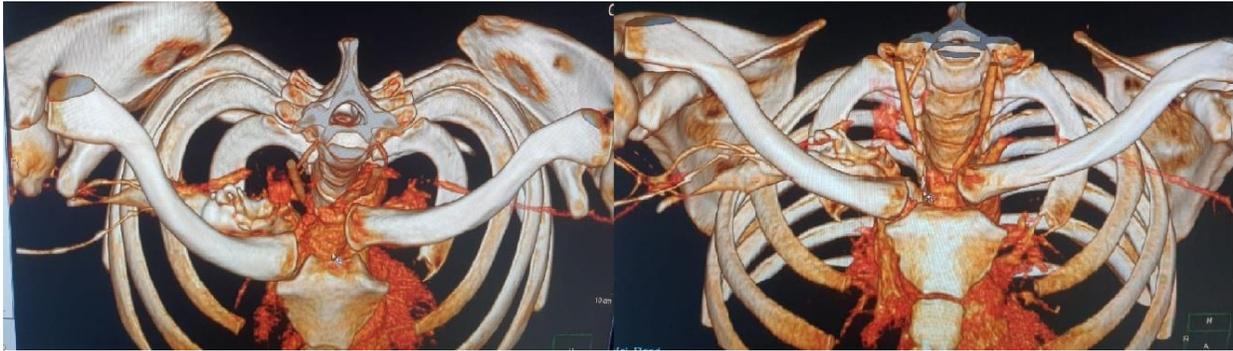
## Introduction

"Sternoclavicular joint dislocation (SCJD) is a rare entity, accounting for less than 1% of all dislocations in the body, and approximately 3% of all shoulder girdle injuries. Of all the SCJD cases, 90% to 95% are anterior, and the rest are posterior. These types of injuries are mainly associated with high-impact trauma, but they can also occur as sports injuries or sometimes simple falls.<sup>1,2</sup> Posterior SCJD can be life-threatening because of its relation to mediastinal structures. It can cause tracheal compression, injury to the brachial plexus, vocal cord paralysis, pneumothorax, respiratory compromise, and vascular injuries.<sup>3</sup> Most of the complications are acute, but late-appearing complications are observed in unreduced posterior dislocations and include thoracic outlet syndrome, brachial neuropathy, subclavian artery stenosis, exertional dyspnea, and septicemia following tracheoesophageal fistula. The main treatment of Anterior SCJD is closed reduction. Urgent closed reduction is advised for posterior SCJD, and if it fails, operative management is warranted.<sup>4</sup> Various surgical techniques have been used, such as osteosynthesis with pins and K wires, plate fixation, and ligament fixation. We describe a figure-of-eight reconstruction technique using the semitendinosus tendon as an autograft in a patient with traumatic posterior SCJD.

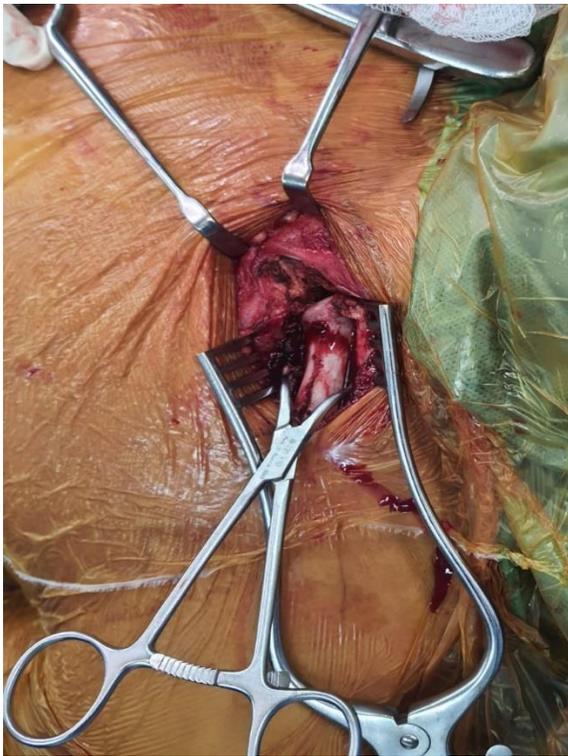
## Case Report

A 21-year-old male patient was admitted to Nizwa hospital with a high-impact motor vehicle accident on 6th July. On arrival, the patient was conscious and oriented with a GCS of 15. The patient complained of left-sided chest pain with tenderness at the left sternoclavicular joint. He had severe pain at the site of the left SCJ with movement of the left arm and shoulder. The Chest X-ray showed a posterior left SCJ dislocation, with the clavicle displaced posteriorly [Figure 1]. A CT scan was performed to rule out other injuries. CT chest with 3D reconstruction confirmed the finding,

showing posterior dislocation of the left SCJ, with displacement of the trachea to the right along with compression of the mediastinal structure's posterior to the joint [Figure 2].



**Figure 1:** Preoperative CT reconstructed image showing left posterior dislocation of left sternoclavicular joint.



**Figure 2:** Operative image.

Closed reduction was attempted but was not successful. It was decided to take the patient for open reduction with fixation and reconstruction of the joint. The patient was positioned in the beach chair position, and the shoulder, whole clavicle, and sternum were exposed. The arm was placed by the side of the patient, and the contralateral leg was prepared to harvest the semitendinosus tendon. The semitendinosus autograft was harvested first using the standard technique. A 4 cm incision was made at the point of insertion of the pes anserinus. The sartorius fascia was incised, exposing the semitendinosus tendon on its undersurface. Approximately 16 cm of the tendon was harvested. The graft was cleared of all the tissue. The diameter of the tendon should be such that it can pass through a 4.8 mm drilled tunnel. A number 2 ethibond suture was used as a locking whipstitch at the free end of the tendon to help in passing it through the tunnel. The graft was kept in saline-soaked gauze. After that, an 8 cm incision was made over the left SCJ. The medial end of the clavicle and manubrium was exposed subperiosteally using a periosteal elevator, taking

care not to injure the underlying neurovascular structures. To fully reduce the SCJ, a small portion of the medial part of the clavicle was excised. After clearing the hematoma, the joint was identified, and the intra-articular disc was removed. Once satisfied with the reduction, the bone was drilled to create the tunnel for the passage of the tendon. Underlying structures were protected by putting a spatula beneath while drilling the bone. The first 2 parallel holes were drilled along the articulating edge of the clavicle, then similar holes were drilled along the articulating edge of the manubrium. The edges of the holes were smoothed with a small curette to ease the passing of the tendon. Shuttle sutures no. 0 vicryl were placed in the tunnels for threading the graft into the tunnel. The graft is passed in a figure-of-eight configuration, with the limbs of the graft crossing over the joint anteriorly. Care is taken that the graft should slide freely in the tunnels. The SCJ is reduced by putting tension on the traction sutures at the end of the two limbs of the graft. While maintaining the reduction, multiple 2-0 ethibond sutures are placed on the different limbs of the graft and on the knot to secure the graft from loosening. After ensuring the stability of the joint and graft tension, the wound is closed in layers. Postoperative CT reconstruction showed good and stable repair, with a reduced joint [Figure 3].



**Figure 3:** Postoperative CT reconstructed image showing reduced joint after figure of 8 reconstruction technique using semitendinosus tendon.

Postoperative rehabilitation is very important. The patient's arm was immobilized by a sling for 4 weeks. After 4 weeks, assisted motion was done with initial maximum abduction to 90 degrees. Progressive range of motion and weight-bearing were allowed according to the clinical course.

## Discussion

The dislocation of the SCJ is very rare,<sup>5</sup> with anterior SCJD occurring three times more than the posterior dislocation. This is attributed to the relative weakness of the anterior SC ligament in comparison to the posterior ligament. The leading cause of posterior SCJD is high-energy trauma, with a direct blow to the posterolateral part of the shoulder with the arm in flexion and adduction.<sup>6</sup> Many of these dislocations are attributed to sports injuries, but they are also seen after motor vehicle accidents, as in this case, or falls from height.<sup>7</sup>

The sternoclavicular joint (SCJ) is an important articulation for the movement of the shoulder girdle and is the only bony attachment of the arm to the axial skeleton. It is a saddle-type synovial joint between the medial end of the clavicle, the clavicular notch of the manubrium, and the upper medial surface of the first costal cartilage. The joint is stabilized by the anterior sternoclavicular ligament anteriorly and the stronger posterior sternoclavicular ligament posteriorly. The continuation of the deep cervical fascia forms the interclavicular ligament and connects the medial heads of the two clavicles. The costoclavicular ligament connects the clavicle to the first rib and the first costal cartilage. The injury to all these ligaments will cause the posterior dislocation of the joint.<sup>8</sup>

The usual presentation is pain around the medial aspect of the clavicle with the movement of the shoulder and neck, along with a gap in the medial aspect of the clavicle with swelling. Other symptoms depend on the injury to adjacent structures, like dyspnea, hoarseness of voice, or dysphagia. If the injury is initially missed, it may present later with tracheal stenosis, thoracic outlet syndrome, vascular injury, or brachial plexopathy.<sup>6,7</sup>

X-ray with standard views may miss the injury, is often inaccurate, and hard to interpret. Special views like the serendipity view, 40-degree cephalic tilt may provide some insight. CT scan or MRI scan is ideal for diagnosing the injury. They also help to rule out any damage to the surrounding structures, particularly those lying posterior to the SCJ. A contrast study is required to rule out any vascular injury.

Anterior SJCD is usually managed conservatively. Posterior SJCD requires a more aggressive approach. The preferred method of treatment is closed reduction, preferably in the operating theater because of the proximity of intrathoracic and mediastinal structures. Tepolt et al in their meta-analysis found the chances of success in closed reduction are low if performed later than 48 hrs.<sup>9</sup> If closed reduction fails, then open reduction with internal fixation (ORIF) is advised, with a cardiothoracic surgeon on standby. The cardiothoracic surgeon is required in case there is damage to the vessels which are behind the SCJ in posterior dislocation or to deal with any injury to mediastinal structures while mobilizing the joint or drilling the bone.

There is a lack of consensus on the optimal operative technique for posterior SJCD because of the rarity of this type of injury. Various techniques have been described to achieve a stable SC joint through ORIF. These include ligament repair with reconstruction,<sup>10</sup> plate fixation,<sup>11</sup> and figure-of-eight reconstruction using various tendons. According to the literature, ligament repair with reconstruction is the most used method.<sup>12</sup> Advantages of the figure-of-eight technique include superior biomechanical stability, particularly in the posterior direction. The use of autologous tissue improves healing, reduces the risk of infection, and enhances tissue integration.<sup>13</sup> Kitchener wire and pin are now contraindicated because of the reported cases of their migration into vital structures.<sup>14</sup>

## Conclusion

Dislocation of SCJ is very rare and requires high-impact energy transmission through the joint. Posterior dislocations have an increased chance of injury to the innominate vein and subclavian vessels, so prompt action is required. If a stable closed reduction is not possible, then open reduction with fixation is necessitated. Several techniques for SCJ fixation have been described, but there is no consensus on which technique is better because of the rarity of the injury. We have used the figure-of-eight reconstruction technique using the semitendinosus tendon with good results. This technique can be easily duplicated in a safe, efficient manner if proper attention is given to the operative steps."

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