



# Unraveling Intraoperative Shoulder Dislocation with Point-of-Care Ultrasound in a Patient Positioned Prone for Spine Surgery

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A 24-year-old patient diagnosed with a T8 schwannoma was scheduled to undergo laminectomy and excision of the tumor. He had no known comorbidities but had a past history of anterior dislocation of the right shoulder 3 months earlier for which he had undergone closed reduction without anesthesia. He had no pain or restriction of movements in the right shoulder, and consent for high risk of repeat shoulder dislocation on prone positioning was obtained. After placing the standard American Society of Anesthesiologists monitors and intravenous access, general anesthesia was administered with intravenous fentanyl (2 µg/kg), propofol (2 mg/kg), and vecuronium (0.1 mg/kg), and the left radial artery was cannulated. Anesthesia was maintained with sevoflurane (minimum alveolar concentration [MAC]: 0.8–1.0) with an oxygen-to-air mixture ratio of 1:1. All the lines were secured; fraction of inspired oxygen (FiO<sub>2</sub>) was increased to 1.0; equipment like, gel bolsters, arm boards, and foam rests were kept ready; and all monitors (except invasive blood pressure monitoring) and airway circuit were disconnected. The patient was turned prone like a log of wood, with special attention to the right shoulder. After turning the patient prone on the surgical table with gel-based bolsters placed under the chest and iliac crest, the shoulders were abducted and carefully rotated with the elbows flexed and arms placed on arm boards. However, after doing so, there was a limitation of motion of the right shoulder and asymmetry between the right and left shoulders. An ultrasound (Sonosite Edge ultrasound system, Japan) examination of the right shoulder was conducted by the anesthetist and the orthopaedic surgeon, with a curvilinear probe (2- to 5-MHz frequency), at the right scapular region. It aided the immediate diagnosis

of shoulder dislocation and the dynamic reduction and treatment of the shoulder dislocation in the intraoperative period. In addition to the ultrasound, a fluoroscopic examination was also done and both arms were brought to the side of the torso after the right-sided shoulder reduction. The surgery proceeded in this position and the patient was carefully turned supine and extubated without any complications.

Patient positioning is crucial during neurosurgical procedures and always requires good teamwork. Shoulder dislocation is an unusual complication following prone positioning that is sparsely reported in the literature.<sup>1</sup> Anterior shoulder dislocation can be precipitated in prone position due to the anterior distribution of the pressure.<sup>1</sup> Anesthesia can further increase the incidence due to the relaxation of the rotator cuff muscles. Failure to recognize shoulder dislocation can result in limb compartment syndrome, ischemia, rhabdomyolysis, and myoglobinuria.<sup>2</sup> The patient's arms were positioned on arm boards with the shoulders abducted and externally rotated, the elbows flexed, and the forearms pronated. Our neurosurgeons prefer this position for lower thoracic and lumbar spine procedures because the arms do not get in the way during the fluoroscopic examination of the spine. However, it can predispose the patient to shoulder dislocation, followed by brachial plexus injury and arterial impingement.<sup>3</sup> Hence, for patients with a risk factor of shoulder dislocation, both arms can be positioned by the patient's side with adducted shoulders, extended elbows, and supinated forearms.<sup>2</sup> It is suggested that a patient who is planned to be positioned with arms extended overhead should be able to comfortably

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demonstrate this “surrender position” preoperatively.<sup>4</sup> If a patient is unable to do so due to paresthesia, numbness, or restricted mobility, the possibility of tucking the adducted arms should be considered. The diagnosis of anterior dislocation can be made by skillful examination of the shoulder and can be confirmed with radiological imaging intraoperatively. Interestingly, point-of-care ultrasound (POCUS) is highly sensitive for confirming the diagnosis and assessing the success of reduction in real time.<sup>5</sup> The ultrasound examination can be done by standing behind the patient's affected shoulder in prone position, with the humerus in an adducted position and the elbow supported inferiorly. A curvilinear probe or a high-frequency linear array probe, depending on the patient's habitus, is placed in a transverse position parallel and just inferior to the scapular spine with the probe marker to the patient's left.<sup>5</sup> The probe is then moved laterally till the glenoid and humeral head are visualized. Anterior and posterior dislocations can be easily distinguished by the relation of the humeral head to the glenoid fossa on ultrasound on POCUS.<sup>5</sup> Stimson's method and a stepped approach can help reduce dislocated humeral head in the prone position with continuous gravity-assisted traction and scapular manipulation without turning the

patient supine.<sup>6</sup> In our case, a high degree of suspicion aided with POCUS led to the timely diagnosis and management of the pathology, thereby averting potentially disastrous clinical and medicolegal consequences.

#### Conflict of Interest

None declared.

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