

# Greater Auricular Nerve Palsy After Arthroscopic Anterior-Inferior and Posterior-Inferior Labral Tear Repair Using Beach-Chair Positioning and a Standard Universal Headrest

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## Abstract

Shoulder arthroscopy is a common treatment for numerous different pathologies. An iatrogenic nerve injury that occurs during shoulder arthroscopy is more common than previously recognized. However, though many nerve pathologies are increasingly being recognized, reported cases of greater auricular nerve injury are limited. For instance, a case of greater auricular nerve palsy was reported in only 2 series that used a horseshoe headrest. One set of authors discontinued and recommended against use of this headrest, and the other recommended a headrest redesign.

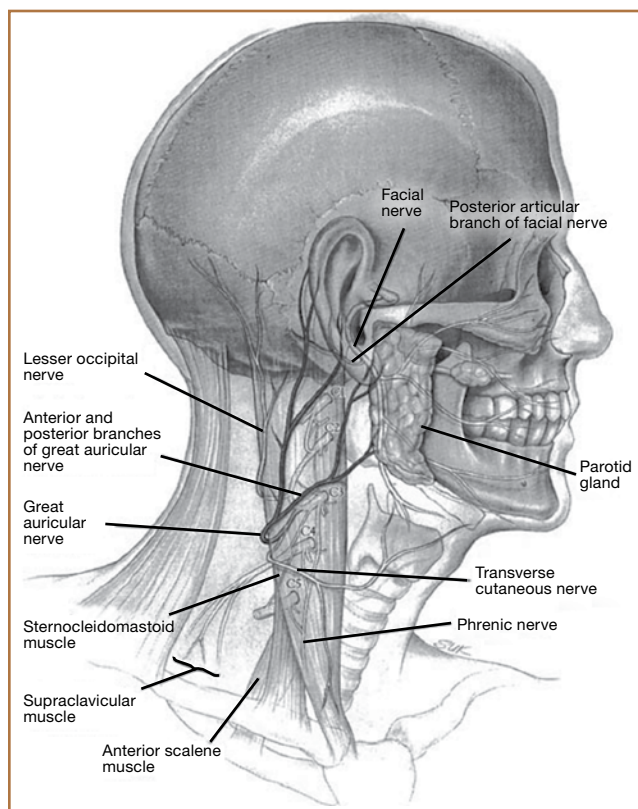
Here we report on a case of greater auricular nerve palsy that occurred after the patient's anterior-inferior and posterior-inferior labral tear was arthroscopically repaired using beach-chair positioning and a standard universal headrest. The palsy resulted in numbness and dysesthesia, which lessened gradually over 3 months after surgery and was completely resolved by 6 months.

Anterior-inferior and posterior-inferior labral tears are common injuries treated with arthroscopic surgery<sup>1</sup> typically performed with beach-chair<sup>2,3</sup> or lateral decubitus<sup>1,2</sup> positioning and variable headrest positioning. Iatrogenic nerve damage that occurs after arthroscopic shoulder surgery—including damage to the suprascapular, axillary, musculocutaneous, subscapular, and spinal accessory nerves—has recently been reported to be more common than previously recognized.<sup>2,4</sup>

Although iatrogenic nerve injuries are in general being recognized,<sup>1,2,4</sup> reports of greater auricular nerve injuries are limited. The greater auricular nerve is a superficial cutaneous nerve that arises from the cervical plexus at the C2 and C3 spinal nerves, obliquely crosses the sternocleidomastoid

muscle, and splits into anterior and posterior portions that innervate the skin over the mastoid process and parotid gland.<sup>5,6</sup> In particular, as illustrated by Ginsberg and Eicher<sup>6</sup> (Figure 1), its superficial anatomy lies very near where a headrest is posi-

**Figure 1.** Greater (“great”) auricular nerve in relation to common anatomical landmarks. Reproduced with permission from: Ginsberg LE, Eicher SA, Great Auricular Nerve: Anatomy and Imaging in a Case of Perineural Tumor Spread, *American Journal of Neuroradiology*, volume 21, issue 3, pages 568-571, copyright 2000 by American Society of Neuroradiology.



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**Figure 2.** Standard universal headrest used during arthroscopic shoulder surgery to treat patient with anterior-inferior and posterior-inferior labral tear.



**Figure 3.** Headrest positioning during patient's arthroscopic shoulder surgery.

tioned during arthroscopic surgery, and increased pressure on the nerve throughout arthroscopic shoulder surgery may lead to neurapraxia.<sup>6,7</sup> In 2 case series, authors reported on a total of 5 patients who had greater auricular nerve palsy after uncomplicated shoulder surgery using beach-chair positioning and a horseshoe headrest.<sup>7,8</sup> The authors attributed these palsies to the horseshoe headrest, which they believed was compressing the greater auricular nerve during the entire surgery.<sup>7,8</sup> However, standard universal headrests, which are thought to distribute pressures that would theoretically place the greater auricular nerve at risk for palsy, previously had not been described as contributing to palsy of the greater auricular nerve.

In this article, we report on a case of greater auricular nerve palsy that occurred after the patient's anterior-inferior and posterior-inferior labral tear was arthroscopically repaired using beach-chair positioning and a standard universal headrest. The patient provided written informed consent for print and electronic publication of this case report.

### Case Report

An 18-year-old right-hand-dominant high school American football player was referred for orthopedic evaluation of left chronic glenohumeral instability after 6 months of physical therapy. Physical examination revealed a positive apprehension test with the shoulder abducted and externally rotated at 90° and a positive relocation test. The patient complained of pain and instability when his arm was placed in a cross-chest abducted position and a posteroinferiorly directed axial load was

applied. Magnetic resonance arthrogram showed an anterior-inferior labral Bankart tear with a small Hill-Sachs lesion to the humeral head but did not clearly reveal the posterior-inferior labral tear. Because of persistent left shoulder instability with most overhead activities and continued pain, the patient decided to undergo left shoulder arthroscopic Bankart repair with inferior capsular shift and posterior-inferior labral repair with capsulorrhaphy. He had no significant past medical history or known drug allergies.

The patient was placed in the standard beach-chair position: upright at 45° to the floor, hips flexed at 60°, knees flexed at 30°. Pneumatic compression devices were placed on his lower extremities. His head was secured in neutral position to a standard universal headrest (model A-90026; Allen Medical Systems, Acton, Massachusetts) (Figures 2, 3). Care was taken to protect the deep neurovascular structures and bony prominences throughout. The patient was in this position for 122 minutes of the operation, from positioning and draping to wound closure and dressing application. Before draping, the anesthesiologist, head nurse, and circulating nurse ensured that head and neck were in neutral position. The anesthesiologist monitored positioning throughout the perioperative period to ensure head and neck were in neutral, and the head did not need to be repositioned during surgery. Standard preoperative intravenous antibiotics were given.

General anesthesia and postoperative interscalene block were used. Standard preparation and draping were performed. Three standard arthroscopic portal incisions were used: posterior, anterior, and anterosuperolateral. Findings included extensive labral pathology, small bony Hill-Sachs lesion to humeral head, small bony anterior glenoid deficiency, and deficient anterior-inferior and posterior-inferior labral remnant. These were repaired arthroscopically in a standard fashion using bioabsorbable suture anchors. There were no arthroscopic complications. After surgery, a standard well-fitted shoulder immobilizer was placed. The anesthesiologist provided inter-

scalene regional analgesia (15 mL of bupivacaine 0.5%) in the recovery area after surgery.

Postoperative neurovascular examination in the recovery room revealed no discomfort. The patient was discharged the same day. At a scheduled 1-week follow-up, he complained of numbness and dysesthesia on the left side of the greater auricular nerve distribution. A diagnosis of greater auricular nerve palsy was made by physical examination; the symptoms were along the classic greater auricular nerve distribution affecting the lower face and ear (Figure 4). The patient had no pain, skin lesions, or soft-tissue swelling. Otolaryngology confirmed the diagnosis and recommended observation-only treatment of symptoms. Symptoms lessened over the next 3 months, and the altered sensation resolved without deficit by 6 months. In addition, by 6 months the patient had returned to full activities (including collision sports) pain-free and with normal left shoulder function. Because symptoms continued to improve, the patient was followed with clinical observation, and a formal work-up was not necessary.

## Discussion

The most important finding in this case is the greater auricular nerve palsy that occurred after arthroscopic anterior-inferior and posterior-inferior labral repairs in beach-chair positioning. This greater auricular nerve palsy was the first encountered by Dr. Foad, who over 17 years in a primarily shoulder practice setting has used beach-chair positioning exclusively. Previous reports have described a palsy occurring after arthroscopic shoulder surgery using beach-chair positioning and a horse-shoe headrest.<sup>7,8</sup> Ng and Page<sup>7</sup> discontinued and recommended against use of this headrest because of the complications of the palsy, and Park and Kim<sup>8</sup> recommended a headrest redesign. We think the present case report is the first to describe a greater auricular nerve palsy that occurred after arthroscopic surgery using a standard universal headrest, which theoretically should prevent compression of the greater auricular nerve. Increased awareness of the possibility of greater auricular nerve palsy, even when proper precautions are taken,<sup>1</sup> is therefore warranted.

Based on the location of our patient's palsy, we think his paralysis was most likely the result of nerve compression by the headrest during the shoulder surgery. Other factors, though unlikely, may have played a role. These include operative time (increases duration of nerve compression) and head positioning. However, 122 minutes is not unusually long for a patient's head to be in this position during a procedure, and over the past 10 years the same anesthesiologist, head nurse, and circulating nurse have routinely used the same beach-chair positioning and headrest for Dr. Foad's patients. Second, the postoperative interscalene block theoretically could have caused the palsy, but we think this is unlikely, as the block is placed lower on the neck, at the C6 level, and the greater auricular nerve branches off the C2–C3 spinal nerves. As described by Rains and colleagues,<sup>9</sup> other authors have reported transient neuropathies to the brachial plexus, which originates in the C5–C8 region, but not to the greater auricular nerve. Last, it cannot be ruled out that a variant of the greater auricular nerve could have played

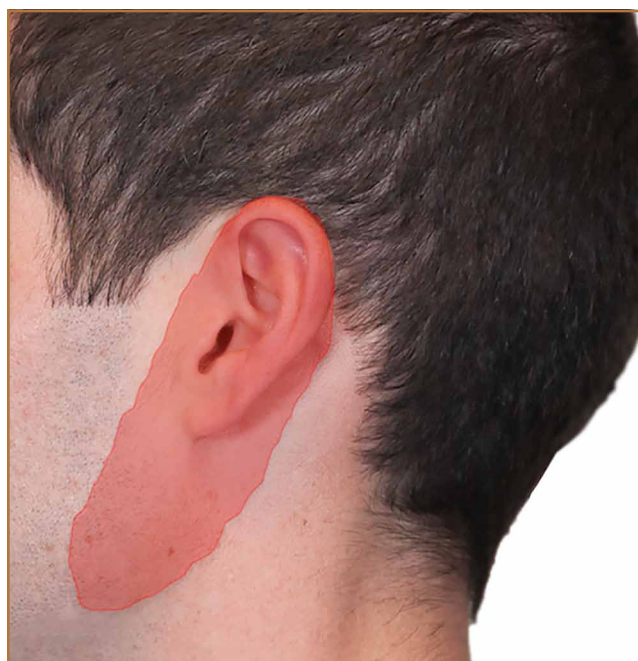


Figure 4. Patient's postoperative palsy (shaded in red) followed classic distribution of greater auricular nerve and led to diagnosis of greater auricular nerve palsy.

a role, given the variation in the greater auricular nerve.<sup>10,11</sup> However, Brennan and colleagues<sup>10</sup> reported that 2 of 25 neck dissections involved a variant in which the anterior division of the greater auricular nerve passed into the submandibular triangle and joined the mandibular region of the facial nerve. Stimulation of this nerve resulted in activity of the depressor of the lower lip, which was not the location of our patient's palsy. In addition, our patient's symptoms followed a classic nerve distribution of the greater auricular nerve (Figures 1, 4), which would seem to decrease the likelihood that a variant was the source of the palsy.

The superficial nature of the greater auricular nerve, which runs roughly parallel with the sternocleidomastoid muscle and innervates much of the superficial region of the skin over the mastoid, parotid gland, and mandible,<sup>5-7</sup> theoretically places the nerve at risk for compressive forces from the headrest during arthroscopic shoulder surgery. Skyhar and colleagues<sup>3</sup> first described beach-chair positioning as an alternative to lateral decubitus positioning, which had been reported to result in neurologic injury in about 10% of surgical cases.<sup>9</sup> The theoretical advantages of beach-chair positioning are lack of traction needed and ease of setup, which would therefore decrease the possibility of neuropathy.<sup>1,3</sup> However, as seen in this and other case reports,<sup>7,8</sup> greater auricular nerve neuropathy should still be considered a possible complication, even when using beach-chair positioning.

Besides neuropathy after arthroscopic shoulder surgery, as described in previous case reports<sup>7,8</sup> and in the present report, greater auricular nerve injury has been described as arising from other stimuli. Greater auricular nerve injury has arisen

after perineural tumor metastasis,<sup>6</sup> neuroma of greater auricular nerve after endolymphatic shunt surgery,<sup>12</sup> internal fixation of mandibular condyle,<sup>13</sup> and carotid endarterectomy.<sup>14,15</sup> Given the superficial nature of the greater auricular nerve, it may not be all that surprising that a palsy could also develop after headrest compression during arthroscopic shoulder surgery.

This case report brings to light a possible complication of greater auricular nerve palsy during arthroscopic shoulder surgery using beach-chair positioning and a standard universal headrest. Studies should now investigate whether greater auricular nerve palsy is more common than realized, especially with regard to specific headrests in beach-chair positioning. For now, though, Dr. Foad's intention is not to change to a different headrest or discontinue beach-chair positioning but to draw attention to this rare complication. Additional attention should be given to the location of the headrest in relation to the greater auricular nerve, especially in cases in which operative time may be longer.

### Conclusion

We have reported a greater auricular nerve palsy that occurred after arthroscopic shoulder surgery for an anterior-inferior and posterior-inferior labral tear. This is the first report of a greater auricular nerve palsy occurring with beach-chair positioning and a standard universal headrest. Symptoms resolved within 6 months. New studies should investigate the incidence of greater auricular nerve palsy after arthroscopic shoulder surgery.

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