

# Lateral Femoral Cutaneous Nerve Palsy Following Shoulder Surgery in the Beach Chair Position: A Report of 4 Cases

Alexander M. Satin, MD, Anthony A. DePalma, MD, John Cuellar, MD, and Konrad I. Gruson, MD

## Abstract

Neuropathy of the lateral femoral cutaneous nerve can present as pain, decreased sensation, and/or burning or tingling on the anterolateral thigh.

We present 4 cases of lateral femoral cutaneous nerve palsy following shoulder surgery in the beach chair position, all of which occurred in obese patients. This complication, to our knowledge, has never been reported in conjunction with the beach chair position. We believe that the neurapraxia was due to external compression by the patients' abdominal pannus. Full resolution of symptoms can be expected within 6 months following conservative management. A preoperative discussion regarding this complication should occur with obese patients undergoing shoulder surgery in the beach chair position.

**B**rachial plexopathy and peripheral nerve injuries, both near to and remote from the operative site, following arthroscopic shoulder surgery have previously been reported in the literature.<sup>1-8</sup> The vast majority of these injuries are neurapraxias and are associated either with traction or exposure of various nerves to external compression secondary to patient positioning. Both the lateral decubitus<sup>1-4,9</sup> and beach chair positions<sup>5,6,8</sup> have been implicated. Injury specific to the lateral femoral cutaneous nerve (LFCN) has been cited as a complication following shoulder arthroscopy<sup>4</sup> and total hip arthroplasty<sup>10,11</sup> in the lateral decubitus position, obstetrical procedures in the lithotomy position,<sup>12,13</sup> and spine surgery in the prone position.<sup>14-17</sup> This complication, however, has, to our knowledge, never been reported following orthopedic shoulder procedures in the beach chair position.

The LFCN is a purely sensory nerve typically composed of the L2 and L3 dorsal roots. It is most likely to be compressed as it exits the pelvis<sup>18</sup> beneath the inguinal ligament in the region of the anterior superior iliac spine, although compression may occur at any point throughout its course.<sup>16</sup> Anatomic variations in the course of the nerve have been described and may place

the patient at an increased risk for developing compression neurapraxia.<sup>9,19</sup>

We present 4 cases of LFCN palsy following shoulder surgery in the beach chair position, all of which occurred in obese patients. The patients provided written informed consent for print and electronic publication of these case reports. The study was conducted at the Albert Einstein College of Medicine (Bronx, New York), and institutional review board approval was obtained.

## Case 1

A 62-year-old right-hand-dominant woman presented with chronic left shoulder pain and functional disability despite nonoperative management for a full-thickness rotator cuff tear. Her calculated body mass index (BMI) was 42.9. Interscalene regional anesthesia was used. She was positioned upright in the beach chair and secured to the operative table using a lap belt. The patient underwent an arthroscopic left rotator cuff repair with a double-row suture bridge technique in addition to a subacromial decompression. A single anchor required intraoperative revision given poor fixation of the initial screw in the bone, adding to the operative time. Total surgical time was recorded as 150 minutes.

At her second postoperative office visit 2 weeks after surgery, the patient complained of severe pain and numbness over the entire anterolateral aspect of the right thigh. She stated that she had this problem since surgery. Examination of the right thigh demonstrated 5/5 quadriceps function and decreased sensation to light touch over the anterolateral thigh. Below the knee, she was neurovascularly intact. After consultation with a neurologist regarding treatment options, the patient was started on gabapentin 100 mg 3 times daily for 2 weeks. At 15-week follow-up, she stated that the pain had completely resolved, but she remained numb over the thigh. By 6-month follow-up, the numbness had completely resolved as well.

## Case 2

A 34-year-old right-hand-dominant woman with known rheumatoid arthritis and end-stage glenohumeral degenerative changes presented with severe right shoulder pain. She was chronically on prednisone and methotrexate sodium.

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Her calculated BMI was 43.9. Given her persistent symptoms, the patient underwent an uncomplicated right total shoulder arthroplasty with biceps tenodesis. She was positioned in the beach chair with a lap belt restraint. The procedure was performed under a combination of general and interscalene regional anesthesia. Total surgical time was recorded as 220 minutes.

At her first postoperative visit, the patient complained of severe pain on the right anterior thigh. There was no radiation of the pain distal to the knee joint. She demonstrated decreased sensation to light touch over the anterior and anterolateral thigh to a point proximal to the knee joint. She was able to ambulate without difficulty. Manual strength testing demonstrated no weakness in quadriceps strength. Because of the numerous medications she was already on, the patient elected not to undergo a course of gabapentin and took only the pain medications typically given in the postsurgical period. At 6 weeks, her thigh pain had resolved, and the hypoesthesia was no longer present at her 3-month follow-up visit.

### Case 3

A 35-year-old right-hand–dominant man presented with right shoulder pain. Magnetic resonance imaging (MRI) of the right shoulder demonstrated a partial articular-sided rotator cuff tear with degenerative changes of the acromioclavicular joint. His calculated BMI was 33. Regional anesthesia was used alone. The patient was placed in the modified beach chair position and a strap was used to secure him to the operative table. The patient underwent an arthroscopic transtendon repair of a partial-thickness articular-sided rotator cuff tear, subacromial decompression, and distal clavicle excision. Total surgical time was recorded as 120 minutes.

At his second postoperative visit, the patient complained of numbness on the lateral aspect of the left distal thigh. He stated that there was mild pain associated with the hypoesthesia. There was no extension of the numbness distal to the knee joint, and he was able to ambulate without difficulty. No further testing was ordered and no specific treatment was initiated. By 3 months postoperatively, the numbness had completely resolved.

### Case 4

A 58-year-old right-hand–dominant man presented with chronic right shoulder pain. An MRI of the right shoulder demonstrated an intrasubstance biceps tendon tear with degenerative changes of the rotator cuff. His calculated BMI was 39.6. The patient underwent uncomplicated biceps tenodesis and subacromial decompression under regional and general anesthesia. The patient was also placed in the modified beach chair position. Total surgical time was recorded as 95 minutes.

During his first postoperative visit, the patient complained of numbness in the lateral aspect of his right thigh. Physical examination demonstrated full quadriceps strength and decreased sensation to palpation over the anterolateral thigh. There was no numbness distal to the patient's knee. No further testing was ordered. At his 3-month postopera-

tive visit, the patient reported that his numbness had almost completely resolved.

## Discussion

Neuropathy of the LFCN, often referred to as meralgia paresthetica and originally Bernhardt-Roth syndrome,<sup>20,21</sup> may be characterized by pain, decreased sensation, and/or burning or tingling on the anterolateral thigh. A Dutch study estimated the incidence rate of the condition to be about 4.3 per 10,000 person-years in the general population.<sup>22</sup> Risk factors for its development include wearing tight-fitting clothing,<sup>23</sup> obesity,<sup>24</sup> thinness,<sup>15</sup> and employment type,<sup>25-27</sup> although often the cause is not readily identifiable.<sup>22,24</sup> Some authors have reported an association between the presence of carpal tunnel syndrome and the development of meralgia paresthetica, perhaps indicating a susceptibility for peripheral nerve entrapment.<sup>22</sup> When this disorder follows surgery, its etiology is thought to be from external nerve compression or from direct trauma during surgery. Orthopedic procedures previously associated with this complication include spine surgeries performed in the prone position,<sup>14-17</sup> surgery in the lateral decubitus position,<sup>4,10,11</sup> and iliac crest bone graft harvesting.<sup>28,29</sup>

Nerve injuries resulting specifically from beach chair positioning have been reported.<sup>5,6,8</sup> Mullins and colleagues<sup>5</sup> reported on a case of neurapraxia of the hypoglossal nerve following diagnostic shoulder arthroscopy and open rotator cuff repair in the beach chair position. The authors surmised that pressure from the mandible likely compressed the nerve and recommended careful attention to the position of the patient's head throughout any procedure performed in the beach chair position.<sup>5</sup> Rhee and Cho<sup>8</sup> similarly presented 2 cases of isolated hypoglossal nerve palsy following shoulder surgery in the beach chair position. It was thought that a change in the patients' upper body to a more horizontal position likely resulted in external compression of the nerve. In all cases, nerve function returned to baseline by 12 weeks. Park and Kim<sup>6</sup> reported on a case of lesser occipital neurapraxia and 2 cases of greater auricular nerve compression following shoulder arthroscopy in the beach chair position. The authors postulated the cause as compression from the headrest as well as intraoperative deviation of the patients' heads during surgery. All symptoms resolved within 2 months, and the authors recommended extra padding in the region of the auricle in addition to frequent checks of head positioning.<sup>6</sup>

The LFCN is a purely sensory nerve that originates from the second and third lumbar spinal roots, emerges lateral to the iliopsoas muscle, and exits the pelvis in the region of the anterior superior iliac spine.<sup>17,21</sup> The nerve then commonly travels superficial to the sartorius muscle before bifurcating into anterior (anterolateral thigh) and posterior (proximal lateral thigh) branches.<sup>9</sup> Some variation in the course of the nerve has been described with possible implications for the development of neurapraxia.<sup>19</sup>

Obesity is an important risk factor when considering arthroscopic shoulder surgery in the beach chair position. Abdominal distention, increased visceral weight, or abundance

of adipose tissue may cause the abdominal wall to bend over itself, pushing on the inguinal ligament and forcing the iliac fascia surrounding the LFCN to compress the underlying nerve.<sup>9</sup> Deal and Canoso<sup>30</sup> investigated external compression of the LFCN due to the weight of a large abdomen after observing a case of meralgia paresthetica triggered by sitting and relieved by lying down. A sphygmomanometer cuff was placed over the inguinal ligament between the abdominal flap and thigh to measure groin pressure in the seated position. In their study, 45% of obese patients had measured pressures exceeding a threshold known to produce nerve ischemia.<sup>30</sup> Of note, none of the normal-weight patients had measured pressures that exceeded this threshold. Litwiller and colleagues<sup>12</sup> found that neither hip flexion nor abduction increased measured strain on the LFCN in the lithotomy position. Warner and colleagues<sup>13</sup> reported on 4 cases of LFCN neurapraxia following lithotomy positioning and found that duration in that position but not obesity was associated with postoperative neurapraxia. In a study assessing the outcomes of arthroscopic rotator cuff tears in obese patients, Warrender and colleagues<sup>31</sup> found a significantly increased operative time within the obese cohort, though no complications of nerve injury were reported. In our 4 cases, we believe that the neurapraxia was caused by external compression by the abdominal pannus, with contribution from the extended surgical time (Figure).

Although most patients with postoperative LFCN compression neurapraxia recover spontaneously within 6 months,<sup>16</sup> complete resolution may take up to 2 years.<sup>9</sup> Initially, patients

can be managed conservatively with weight loss, avoidance of tight-fitting clothing, physical therapy, and analgesia. Local nonsteroidal injections,<sup>11</sup> methylprednisolone injections,<sup>18,20</sup> and oral gabapentin<sup>15</sup> have previously been used with success. Electrodiagnostic testing is usually not required.<sup>21</sup> Patients whose symptoms do not improve may benefit from surgery to relieve the entrapped nerve. Several procedures have been advocated for persistent, severe symptoms, including neurolysis or surgical transection, though controversy exists as to which procedure is most effective.<sup>19,32</sup>

By 6 months, all symptoms were resolved in our 4 patients following conservative management. Our current practice involves use of a well-padded, wide lap belt when performing shoulder surgery in the beach chair position, particularly in obese patients. Furthermore, lengthy preoperative discussion is held with obese patients (BMI > 30) specifically regarding the potential for this complication. Finally, every effort is made to minimize operative time in the beach chair position.

### Conclusion

LFCN palsy has been described following various orthopedic procedures, in particular spine procedures performed in the prone position. This complication has yet to be described following shoulder surgery in the beach chair position. Patient risk factors for its development include obesity. Preoperative discussion of this complication should be held with obese patients undergoing shoulder surgery in the beach chair position. Surgical time should be kept to a minimum. It is important to



Figure. Obese patients placed in the beach chair position are at risk for lateral femoral cutaneous nerve palsy secondary to compression by their abdominal pannus.

note that even a well-padded, wide lap belt can tighten as the patient is maneuvered from the supine position for the anesthetic induction to the semi-seated beach chair position. As a result, we recommend reassessing the tightness of the restraining belt after moving the patient into the beach chair position. Should LFCN neurapraxia develop despite these efforts, conservative management, including rest and reassurance, is recommended, with complete resolution in the majority of cases. More aggressive management, including local injections, may be considered in patients with refractory symptoms that last more than 6 months.

Dr. Satin is Resident, Department of Orthopaedic Surgery, North Shore-LIJ, New Hyde Park, New York. Dr. DePalma is Resident, Department of Radiology, Rutgers Robert Wood Johnson Medical School, Piscataway, New Jersey. Dr. Cuellar is Resident, and Dr. Gruson is Assistant Professor, Department of Orthopaedic Surgery, Albert Einstein College of Medicine, Bronx, New York.

Address correspondence to: Konrad I. Gruson, MD, Department of Orthopaedic Surgery, Albert Einstein College of Medicine, 1250 Waters Place, 11th Floor, Bronx, NY 10461 (tel, 347-577-4412; e-mail, kgruson@montefiore.org).

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