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ORIGINAL ARTICLE

Injury to the axillary and suprascapular nerves in rotator cuff arthropathy and after reverse shoulder arthroplasty: a prospective electromyographic analysis

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Background: Neurologic pre- and postoperative injuries to the axillary and/or suprascapular nerve (SSN) have a higher incidence than expected and may lead to significantly decreased functional outcomes and increased risk of reverse shoulder arthroplasty (RSA) failure.

Methods: Patients who underwent a RSA for rotator cuff tear arthropathy (RCTA) were included from December 2014 to December 2015. This study focused on the clinical (Constant score), radiographic, and pre- and postoperative electromyographic evaluations at 3 and 6 months.

Results: Twenty patients met the inclusion criteria. One was lost to follow-up. Preoperatively, 15 patients showed changes on electromyography (9 SSN and 15 axillary nerve lesions); all of them were chronic and disuse injuries. The mean preoperative relative Constant score (rCS) of all included patients was 39 ± 9 (range, 19-64). At 3 months postsurgery, the prevalence of acute injuries for both nerves was 31.5%. At 6 months postsurgery, 2 axillary nerve injuries and 6 SSN injuries remain unchanged, and the rest improved or normalized. The mean postsurgery rCS of the entire cohort at 6-month follow-up was 78 ± 6.5 . Mean postoperative rCS for acute postoperative nerve injury was 71 ± 3 for the axillary nerve and 64 ± 5 for SSN.

Conclusions: Axillary and SSN injuries in RCTA have a much higher incidence than expected. Most of these axillary lesions are transient, with an almost complete recovery seen on electromyography at 6 months and with scarce functional impact. However, SSN lesions appear to behave differently, with poor functional results and having a lower potential for a complete recovery.

Level of evidence: Level IV; Case Series; Treatment Study

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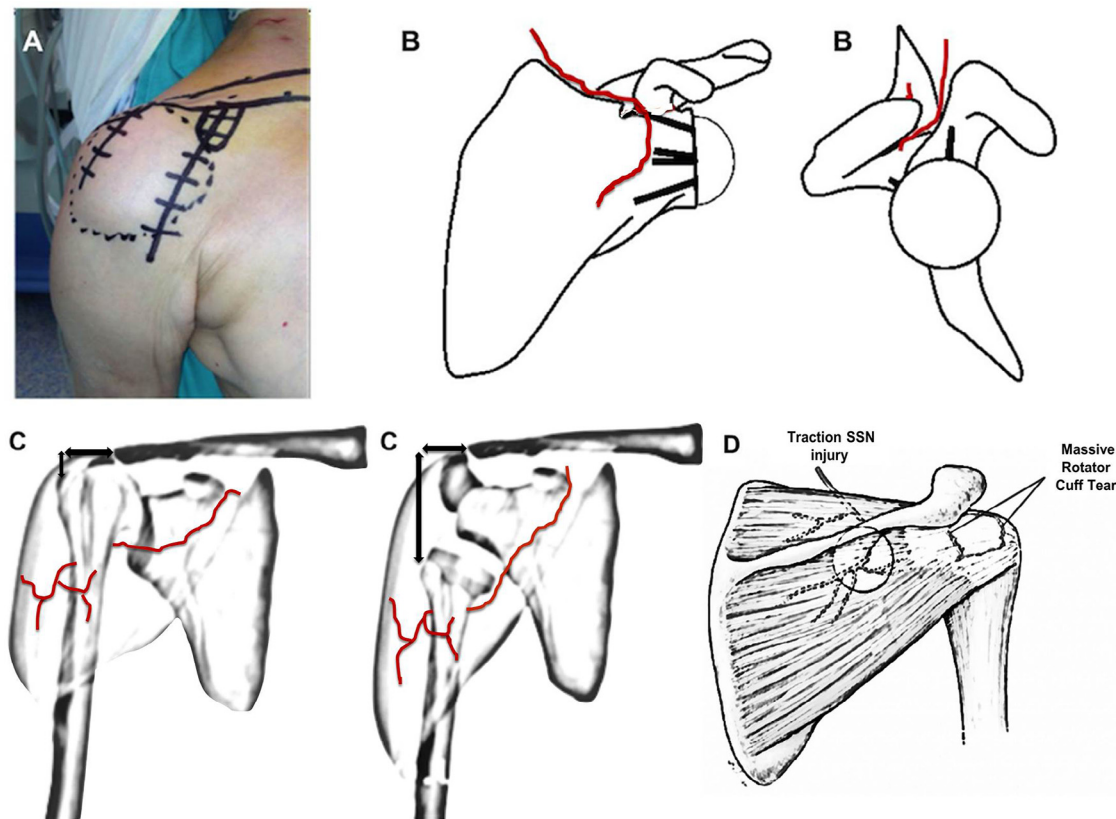


Figure 1 Causes of nerve injury in reverse shoulder arthroplasty (RSA) and cuff tear arthropathy. (A) Surgical approach. (B) Baseplate screw fixation and suprascapular nerve (SSN). (C) Design of RSA increasing the lever arm of the deltoid, and the lowering of the humerus that increases axillary nerve tension. (D) Traction injury to the nerve from a massive rotator cuff tear.

Reverse shoulder arthroplasty (RSA) is an effective treatment option for patients with rotator cuff tear arthropathy (RCTA).³ It has been reported to produce early satisfactory clinical outcomes. However, the complication rate is higher than that of conventional total shoulder arthroplasty.³⁰ Some of these complications are specific to the design and biomechanical behavior of the RSA. Axillary and suprascapular nerve (SSN) injury during RSA is one of these complications, and it may be related to (1) surgical approach, (2) baseplate screw fixation, and (3) the non-anatomical design of the RSA, which shifts the center of rotation medially, increasing the lever arm of the deltoid, and lowers the humerus, therefore increasing the tension on the axillary nerve. Furthermore, preoperative traction injury to the SSN from a massive rotator cuff tear (RCT) has also been described (Fig. 1),^{1,13,20,26,29} although the actual incidence and prevalence of this association remains largely unknown.

The prevalence of clinically evident neural impairment after RSA has been reported to be approximately 2%.⁴ However some injuries, especially SSN lesions, cause nonspecific symptomatology (posterior and/or superior shoulder pain, and/or weakness in abduction or external rotation) that can lead to misdiagnosis. An increase in SSN lesion incidence will be expected as soon as shoulder surgeons began considering this complication when functional results after RSA are not as ex-

pected. This is similar to other complications (like acromial fracture) that were also underdiagnosed in the past.¹⁹

We hypothesized that neurologic pre- and postoperative injuries to the axillary and/or SSN had a higher incidence than expected and might lead to significantly decreased functional outcomes and an increased risk of RSA failure.

The objectives of this study were the following: (1) to investigate the incidence of SSN and axillary nerve injuries in RCTA and after RSA; (2) to establish the relationship between arm elongation and nerve injuries after RSA; (3) to determine if there was any association between poor functional outcome in RSA and nerve injury; and (4) to determine the development of clinical nerve injuries using electromyography (EMG).

Methods

After obtaining approval from our Institution Review Board (protocol code C.P.-C.I.14/512-E), patients who met the inclusion criteria were prospectively included in the study from December 2014 to December 2015. They study was conducted according to the Declaration of Helsinki.

The inclusion criteria were patients with RCTA Hamada grades III, IV or V who underwent a RSA, and who were able to understand the information and provide written informed consent. We

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