LETTERS

Frequency of successful intra-articular puncture of the sternoclavicular joint: a cadaver study

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The sternoclavicular joint is commonly involved in rheumatoid arthritis. Treatment with intra-articular corticosteroid injection usually resolves the symptoms rapidly (1,2). Complications following unintentional peri-articular injection of corticosteroid are well documented in the literature (3). By contrast, there are no reports in the literature regarding the frequency of peri-articular injections in sternoclavicular joints. The objectives of this study were: (i) to estimate the frequency of occurrence of peri-articular sternoclavicular joint injections using a cadaver model, and (ii) to investigate the degree to which experience contributes to successful joint injection.

Seventy-six sternoclavicular joints (left and right) from 38 cadaver specimens (20 male, 18 female) with a mean age of 74.8 years (range 59–98 years) and preserved using the method of Thiel were used for the study (8). This special embalming technique provides a close-to-life model through the preservation of the original tissue colour, consistency, and degree of transparency. Specimens with pathological changes of the sternoclavicular joint, detected by means of X-rays, were excluded from the study. An inexperienced resident (first year of training) and a skilled specialist (a surgeon, not a rheumatologist) were chosen to perform the injections. Each punctured a total of 38 sternoclavicular joints. To detect side differences, each examiner punctured 19 joints on the right side and 19 on the left side. The needle (14G, 23Ch) was connected to a 5 mL syringe filled with methyl blue. Following palpation, 0.2 mL of methyl blue was injected into each joint. Punctures were carried out by positioning the needle perpendicular to the centre part of the joint. After completing all 76 injections, arthrotomy was performed for each joint and the location of the injected methyl blue recorded in each case (Figure 1). All results were entered into a computerized database and analysed using Microsoft Excel 2003 (Microsoft Corporation, Redmond, WA, USA). A $\chi^2$-test was used to assess correlations. p-values $< 0.05$ and $\chi^2$ values $> 3.84$ were deemed statistically significant.

The overall rate of peri-articular injections was 22% (17/76). The specialist had a failure rate of 18% (7/38). The resident’s rate of unintended peri-articular injections was slightly higher, at 26% (10/38). No significant correlation between gender (p-value = 0.11, $\chi^2 = 2.55$), side (p-value = 0.14, $\chi^2 = 2.18$), or examiner’s experience (p-value = 0.09, $\chi^2 = 2.87$) and the rate of peri-articular injections was found.

Although injection of corticosteroids into sternoclavicular joints is carried out less frequently than into other joints, this procedure can provide effective pain relief for sufferers of rheumatoid arthritis (1,2). Reports of complications following unintended peri-articular injection of corticosteroid are common in the literature. Peri-articular calcifications are known to be caused by triamcinolone hexacetonide and by prednisone in particular (3–5). Local hypopigmentation or thinning and reduction in collagen fibres are reported as well (6,7). An unintended peri-articular injection may remain undiscovered as it may also lead to the desired effect and relieve the pain of the nearby arthritic joint (9).

The aim of the present study was to assess the frequency of the occurrence of peri-articular sternoclavicular joint injection using a cadaver model approach. A large number of cadaveric sternoclavicular joints were injected with methyl blue (n = 76). Intra-articular methyl blue placement was unsuccessful in 22% of the injected sternoclavicular joints. The success rate of the experienced physician (82%) was slightly higher than that of the novice (74%).
In conclusion, the main message provided by the results of this study is that intra-articular sternoclavicular joint injection is a challenging procedure and even a highly experienced physician cannot guarantee success. An ability to aspirate synovial fluid is a definite sign that the needle is positioned intra-articularly. If aspiration of synovial fluid is impossible, physiological salt solution may be injected in the joint and subsequently aspirated to ensure the intra-articular placement of the needle. Local swelling, lack of pain, and smooth injection do not necessarily indicate correct intra-articular needle placement (10). In difficult or doubtful cases, ultrasound guidance of the intra-articular puncture is recommended as a means of preventing unintended peri-articular injection and subsequent complications.

References

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