CORTICOSTEROID VERSUS VISCOSUPPLEMENTATION AGENTS PERIARTICULAR SHOULDER INJECTION- SHORT TERM EFFICACY AND SECURITY PROFILE - PILOT STUDY

Mihaela C. Micu[1], Amalia Salcă[2], Gabriela B. Dogaru[2 3]

[1.] Rheumatology Division, 2 nd Rehabilitation Department, Clinical Rehabilitation Hospital Cluj-Napoca, Romania

[2.] Clinical Rehabilitation Hospital Cluj-Napoca, Romania

[3] "Iuliu Hatieganu" University of Medicine and Pharmacy Cluj-Napoca

ABSTRACT

Introduction. Peri-articular shoulder pathology treatment may represent a challenge in patients with concomitant diabetes mellitus, high blood pressure and secondary kidney involvment. Systemic pain killers like analgetics or non-steroidal anti- inflammatory drugs may have temporary contraindication. Indeed, corticosteroid peri-articular therapy may be contraindicated or may expose to undesired side effects. Hyaluronic acid derivates may represent a feasible alternative in these patients. **Objectives.** To determine corticosteroid versus Hyaluronate derivates subacromial subdeltoid bursa injection short term efficacy and security profile. **Material and methods.** Ten consecutive patients with diabetes mellitus, high blood pressure and symptomatic, ultrasound proven periarticular shoulder pathology underwent either subacromial subdeltiodian intra- bursa corticosteroid (5 patients) or Hyaluronate derivate (5 patients) injection. Clinical pain reduction and functional outcome was evaluated at baseline and during 2 months follow up. Glucose blood levels and blood pressure values were analyzed in the 5 consecutive days after the interventional maneuver. **Results.** There was a trend in obtaining a quicker clinical response (pain reduction and range of motion improvement) to corticosteroid therapy in comparison with hyaluronate but with similar, significant results for the two therapies at 2 months ($p<0.005$).Glucose levels in patients treated with HA registered a decrease in the next 5 days of follow up. On the contrary, in the CS patient group, glucose levels increased in the next 5 days in all 5 patients, with a trend to reach the baseline levels at the end of the fifth day. Systolic and diastolic pressure values increased dramatically in the first 48 hours in the CS patients group (100%) in comparison to the HA patients group (100%) where both values decreased after the interventional maneuver. **Conclusion.** HA periarticular injection may represent a feasible therapy alternative in shoulder peri-articular pathology for patients with HBP and diabetes mellitus.

Keywords: shoulder, peri-articular corticosteroid injection, HA periarticular injection, ultrasound guided maneuvers

INTRODUCTION

Periarticular shoulder pathology is a common source of distress and disability and a frequent pathology encountered in clinical practice [1,2]. In case of analgesic, non-steroidal anti-inflammatory drugs (NSAIDs) or physiotherapy protocols failure, subacromial corticosteroid (CS) injections therapy may represent another treatment option with good short term results [3,4]. Lately, favorable outcomes regarding viscosupplementation of hyaluronate (HA) and its derivates injected inside the subacromial bursa were published, showing both pain and function improvement [5-9]. Hyaluronic acid is thought to serve as a lubricant and is reported to have an anti-inflammatory effect [9]. One of its advantages is that it doesn't have a negative impact on blood pressure and glucose blood levels making it very suitable in patients with high blood pressure (HBP) and diabetes mellitus (DM).

This contrasts with reported potential systemic side effects of intra-articular CS deposition [10].

In this prospective pilot study, we investigated the efficacy of subacromial HA vs CS injections in the first 2 months after administration and the security profile regarding BP and glucose blood levels elevation within the first 5 days after the interventional maneuver.

Material and methods

This study was approved by the Ethics Committee of the Rehabilitation Hospital Cluj–Napoca, Romania. Written informed consent was obtained from the participants. Ten consecutive patients known with HBP, DM treated with specific therapies and *chronic* (>12 weeks onset) shoulder pain were chosen to participate. Five patients received ultrasound guided injection inside the subacromial subdeltoid bursa (SASDb) with HA and five with CS- Betamethasone. Inclusion criteria were the following: proven ultrasound peri-articular shoulder pathology like subacromial subdeltoid bursitis, tendinosis of the rotator cuff tendons, partial rupture of the supraspinatus (SST), subscapularis (SUBT), infraspinatus tendon (IST), calcific tendinitis, rotator cuff enthesopathy and dynamic ultrasound assessment demonstrating subacromial impingement syndrome. Exclusion criteria included: HA drug allergy, uncontrolled BP with values > 160/90 mmHg, glucose blood levels > 150 mg/dl, proven gleno- humeral joint pathology on conventional radiography or MRI, adhesive capsulitis, total rupture of the SST, SUBT or IST, chronic anticoagulant therapy with INR >3.5, glaucoma, severe concomitant cardio-vascular or digestive pathology.

Baseline assessment included demographic data recording, clinical functional shoulder range of motion (ROM) assessment (abduction, external rotation), ultrasound evaluation of the shoulder structures for inflammatory and or structural lesions- long head of the biceps tendon, rotator cuff tendons (SST, SUBT, IST and teres minor), subacromial subdeltoid bursa, posterior and axillar recesses of the gleno-humeral joint, acromio- clavicular joint, dynamic ultrasound assessment, glucose blood levels and blood pressure evaluation.

Ultrasound assessment was performed with a GE S8 ultrasound machine, linear probe of 8-16 MHz. Grey scale and Doppler assessment using a multi-planar and dynamic scanning protocol was made. Injected drugs were: Hyalgan 20 mg/ 2ml (Fidia Farmaceutici S.P.A, Italy) alone and CS- Diprophos (Betamethasone 7 mg/ml, Schering –Plough NV, Belgium) together with 5 ml of Lidocaine 1%. Hyalgan injection was performed at baseline and repeated after 30 days. Diprophos injection was performed at baseline only.

The follow up schedule for the clinical assessment was made for pain (using a VAS pain scale from 0-10), abduction and external rotation ROM (use of a goniometer, values expressed in degrees). Measurements were made at 48 hours, 1 months and 2 months. Glucose blood level was analyzed 3 times/ day in each patient in the next five consecutive days and mean values were calculated/ day/ patient. Blood pressure was measured 3 times/ day the next five days and average values / day/ patient were calculated. Outcome after SASDb HA vs CS injection for pain, ROM, BP and glucose levels was evaluated between baseline and 2 months follow up in the two patient groups. No changes were allowed in the specific HBP or DM therapy or diet during the first 6 days of follow up.

Statistical analyses

For qualitative data, data were statistically summarized as percentage. Quantitative data were summarized as mean and standard deviation. Statistical significance was set at a p-value <0.05.

Results

Nine women and 1 man, age 62.3 ± 8.53 (years ± SD) entered the study. All (100%) patients presented on ultrasound mild BSASD bursitis and rotator cuff calcific enthesopathy; 5 (50%) of them presented in addition SST tendinosis. All patients were identified with impingement syndrome on dynamic ultrasound assessment. Figure 1 a, b, c presents the injection technique which is similar in both HA or CS injection.

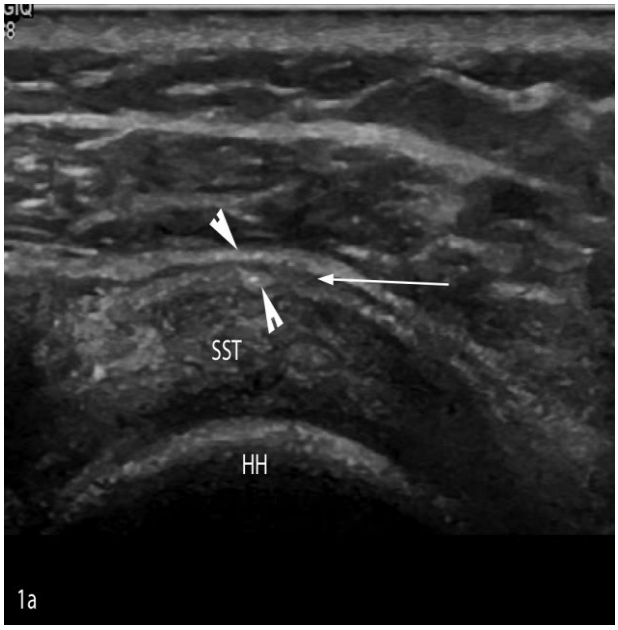


Fig. 1a. Transversal scanning at the level of the supraspinatus tendon. HH- humeral head, SST- supraspinatus tendon, arrow heads- bursa walls, arrow- SASD bursa

Fig. 1b. Transversal scanning at the level of the supraspinatus tendon. HH- humeral head, SST- supraspinatus tendon, arrow- needle penetrating the SASD bursa space

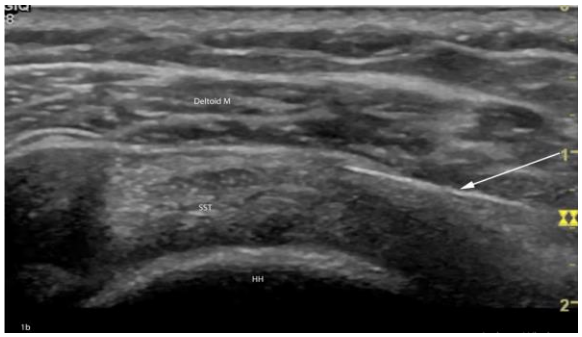
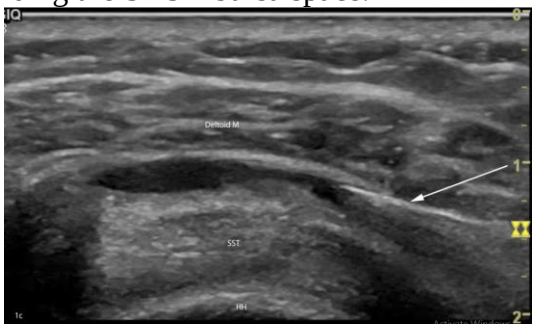
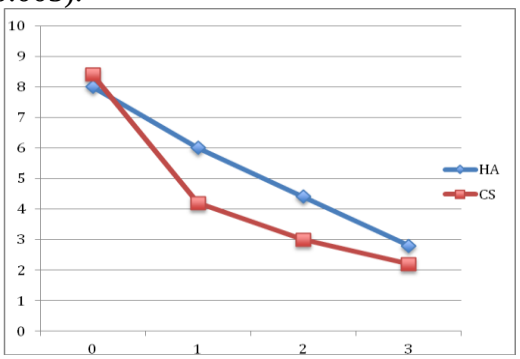


Fig. 1c. Postprocedural transversal scanning at the level of the supraspinatus tendon. HH- humeral head, SST- supraspinatus tendon, arrow- needle penetrating; the drug is distending the SASD bursa space.



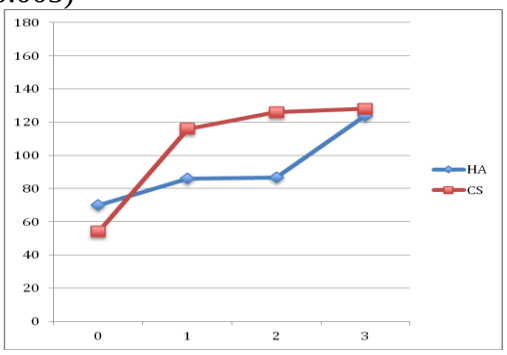
During the observation period, there was a trend in obtaining a quicker clinical response (pain reduction and ROM improvement) to CS therapy in comparison with HA but with similar, significant results for the two therapies at 2 months (Fig 2,3,4).

Fig 2. VAS pain scale at baseline and during follow up in the 2 patients groups ($p<0.005$).



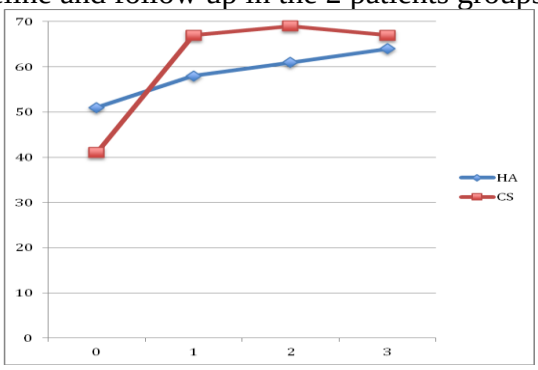
Legend Fig 2. Vertical axis- VAS = 0-10 intensity, HA- hyaluronane patients group, CS- corticosteroid patients group, horizontal axis- 0= baseline, 1= at 48 hours, 2= 1 month, 3= 2 months

Fig 3. Abduction range of motion at baseline and follow up in the 2 patients groups ($p<0.005$)



Legend Fig 3. Vertical axis – abduction range of motion -0-180 degrees (180= normal values), HA- hyaluronane patients group, CS- corticosteroid patients group, horizontal axis- 0= baseline, 1= at 48 hours, 2= 1 month, 3= 2 months.

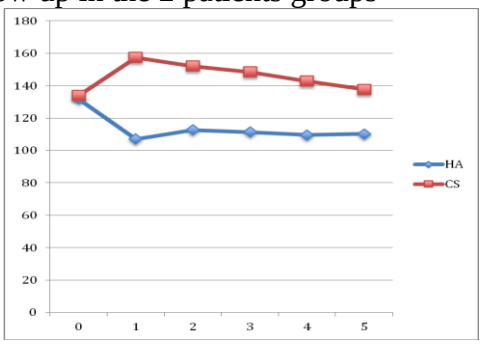
Fig 4. External rotation range of motion at baseline and follow up in the 2 patients groups



Legend Fig 4. Vertical axis – external rotation range of motion -0-70 degrees (70 = normal values), HA- hyaluronane patients group, CS- corticosteroid patients group, horizontal axis- 0= baseline, 1= at 48 hours, 2= 1 month, 3= 2 months.

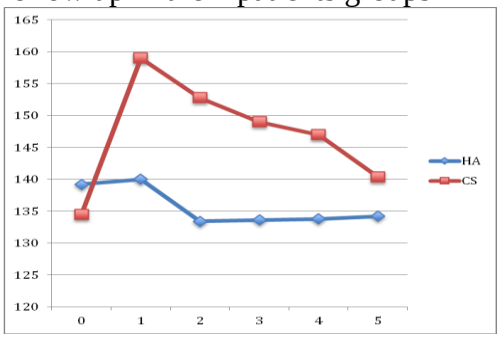
Glucose levels in patients treated with HA registered a decrease in the next 5 days of follow up. On the contrary, in the CS patient group, glucose levels increased in the next 5 days in all 5 patients, with a trend to reach the baseline levels at the end of the fifth day. Systolic and diastolic pressure values increased dramatically in the first 48 hours in the CS patients group (100%) in comparison to the HA patients group (100%) where both values decreased after the interventional maneuver (Fig 5,6a, 6b).

Fig 5. Glucose blood level at baseline and follow up in the 2 patients groups



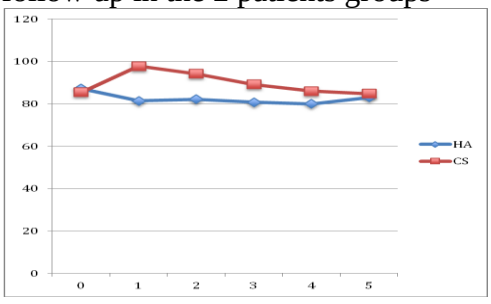
Legend Fig 5. Vertical axis – glucose blood levels expressed in mg/dl (normal values 65-115 mg/dl), HA- hyaluronane patients group, CS- corticosteroid patients group, horizontal axis- 0= baseline, 1-5 (the next five days).

Fig 6a. Systolic blood pressure at baseline and follow up in the 2 patients groups



Legend Fig 6a. Vertical axis – systolic blood pressure mean values (mmHg), HA- hyaluronane patients group, CS- corticosteroid patients group, horizontal axis- 0= baseline, 1-5 (the next five days).

Fig 6b. Diastolic blood pressure at baseline and follow up in the 2 patients groups



Legend Fig 6b. Vertical axis – diastolic blood pressure mean values (mmHg), HA- hyaluronane patients group, CS- corticosteroid patients group, horizontal axis- 0= baseline, 1-5 (the next five days).

Discussions

In our prospective pilot study we showed a significant pain reduction and abduction ROM improvement after both HA and CS SASD bursa injection at 2 months but with a more rapid effect, starting at 48 hours in case of CS injection. Our data are in line with recent published studies comparing CS, HA derivates and saline injection[4,11]

Potential systemic side effects of intra-articular/ intra- bursa CS deposition are known and must be taken into consideration when designing a tailored therapeutic strategy for special patients subgroups. In the majority of the cases, transitory face redness, flushes and BP and glucose blood levels elevation occur. In case of ultrasound guided injections, visual control is possible during the entire interventional maneuver and drug misplacement may be avoided assuring a better efficacy along with less side effects [12,13].

In our study, despite using the guided injection technique, we registered a much higher than expected increase of the glucose level and BP (mainly the systolic component) in patients treated with CS within the first 48 hours and with a slow but progressive down- regulation in the first 5 days after the procedure. On the contrary, in patients treated with HA there was a small post-procedural decrease in both glucose levels and BP values, possible due to pain alleviation. This positive indirect effect is very important to be taken into consideration when designing therapy strategies for diabetic, HBP patients.

Data regarding the HA derivates security profile are encouraging for knee osteoarthritis [14,15.] . In fact, no intra-articular HA product was withdrawn from the market in the last 25 years because of side effects. Few, but encouraging, data are emerging from recent studies showing only minor side effects (headake) after peri-articular HA injection [4]. In our study no patient experienced this side effect.

There are some limitations concerning our study- we had very small patients groups exposed to the selected therapies, we did not randomize the patients and patients and doctors were not blinded for the given therapy. Indeed, we had only one ultrasound assessor performing the evaluation and injection.

Conclusions

Compared to CS periarticular bursa injection , HA intra-bursa injection showed similar results on pain reduction and functional improvement at 2 months with less systemic side effects in patients with HBP and diabetes mellitus. HA periarticular injection may represent a therapy alternative for certain patients subgroups. Further large number, randomized controlled studies are needed to confirm our findings.

Authors' contributions: MCM, AS, GBD participated in the design of the study. MCM performed ultrasound evaluation and data collection. MCM and DGB performed the data analysis. All authors participated in the writing of the manuscript and read and approved the final version.

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