E. Milano

MD-SHOULDER IN THE INTEGRATED REHABILITATION TREATMENT OF SHOULDER PAIN IN POST-STROKE HEMIPLEGIC PATIENTS

SUMMARY

Shoulder pain (SP) is the most frequent complication in patients with post-stroke hemiplegia.
– SP can occur either in the first few weeks after the stroke (most frequently in the first 3 months), or 6-8 months after the acute cerebrovascular event (chronic shoulder pain).
– We recruited 40 patients undergoing ordinary hospitalisation in a Level II rehabilitation hospital for ischaemic stroke (transferred from acute hospital Stroke Units). All patients complained of shoulder pain on the hemiplegic side that presented in the first 3 months after the ischaemic event. The diagnosis of adhesive capsulitis was based on clinical findings and symptoms, as well as standard X-ray and musculoskeletal ultrasound.
– Patients were randomised to 2 treatment groups (Group A and Group B), stratified by age, gender and pain intensity. Outcomes were assessed at 1, 6 and 10 months. Group A was treated with intra-articular injection of Triamcinolone 40 mg 1 vial and Ropivacaine 2% 3 mL (total volume 4 mL) weekly for the first 2 weeks; the third treatment was administered 15 days after the second.
Group B was treated with injection of Guna MD-Shoulder 3 vials (for a total volume of 6 mL) intra-articularly (4 mL) and in the pericapsular area (the remaining 2 mL).
Use of Guna MD-Shoulder made it possible to obtain a biological effect of organic reconditioning of the compromised anatomical structures, and thus obtaining a positive result on the stabilisation of the glenohumeral joint, its range of motion and, therefore, on the pain symptom, not only in the early stage, but especially in the weeks following the treatment, with a continuous improvement of the outcomes recorded at the follow-up time-points.

KEY WORDS

SHOULDER PAIN, POST-STROKE HEMIPLEGIA, MD-SHOULDER

https://www.homeceuconnection.com/blog/proper-positioning-for-stroke-patients/

INTRODUCTION

Shoulder pain (SP) is the most commonly observed complication in patients with post-stroke hemiplegia.
Its incidence varies greatly according to the different clinical studies published in literature, with estimated rates ranging from **16%** to **72%** of cases.

– SP may present either in the first few weeks after the stroke (usually within the first 3 months), or later, 6-8 months after the acute cerebrovascular event (chronic shoulder pain).
For precisely this reason, SP is a complication that can condition the patient's neuromotor rehabilitation treatment and can have even significant repercussions on the functional recovery required for the activities of daily living.
According to the studies consulted, SP is most common **1)** in subjects with right brain injury, **2)** in subjects with spasticity scoring > 1 on the Ashworth scale, **3)** in ischaemic stroke, **4)** among females and **5)** in elderly patients.

– The aetiopathogenesis of shoulder pain in hemiplegic patients is still unclear.
In the late 1950s, Basmajian & Bazant attributed hemiplegic shoulder pain to the **dislocation** of the **glenohumeral joint (GHJD)**.
– This hypothesis, better known as the "Basmajian Theorem", resulted in many

FIG. 1

PROM (Passive Range of motion)

– Absolute values.

PROM – *PASSIVE RANGE OF MOTION*

		GROUP A	GROUP B
T0	ABD	120	122
	ER	94	93
	FLEX	35	34
T1	ABD	130	125
	ER	110	98
	FLEX	50	40
T2	ABD	131	135
	ER	100	100
	FLEX	54	55
T3	ABD	125	140
	ER	100	120
	FLEX	45	60

ABD = Abduction
ER = External rotation
FLEX = Anterior flexion

rehabilitation practitioners using orthoses to prevent dislocation. However, in the 1990s, some authors expressed certain doubts regarding the "responsibility" of GHJD in hemiplegic shoulder pain, claiming that the albeit common association does not necessarily mean there is a cause-effect relationship.

– Nowadays, the Literature is concordant in identifying three possible causes:

1) Conditions affecting the periarticular soft tissues of the GHJ: rotator cuff injury, rotator cuff tendinopathy (most commonly affecting the tendons of the *supraspinatus*, *subscapularis* and *biceps brachii* muscles), glenohumeral dislocation and, most commonly, **adhesive capsulitis**.

– The causes are undoubtedly the consequences of a functional imbalance of the agonist and antagonist muscles of the scapulohumeral girdle and consequently of the overload the shoulder joint is subject to in the course of post-stroke clinical evolution, as muscle flaccidity transitions to hypertonus;

2) CRPS (Complex Regional Pain Syndrome);

3) Central Hypersensitivity: in this case, the brain damage often has a precise location that can be seen on the MRI (thalamus, basal ganglia, cerebellopontine angle, bulb).

Pinpointing the cause of the SP is often rather challenging as, depending on the brain damage, the patient may have an even very complex neurological situation, with cognitive, motor and verbal impairment with aphasia. Furthermore, the clinical signs and symptoms are often rather generic and difficult to correlate with a single aetiology.

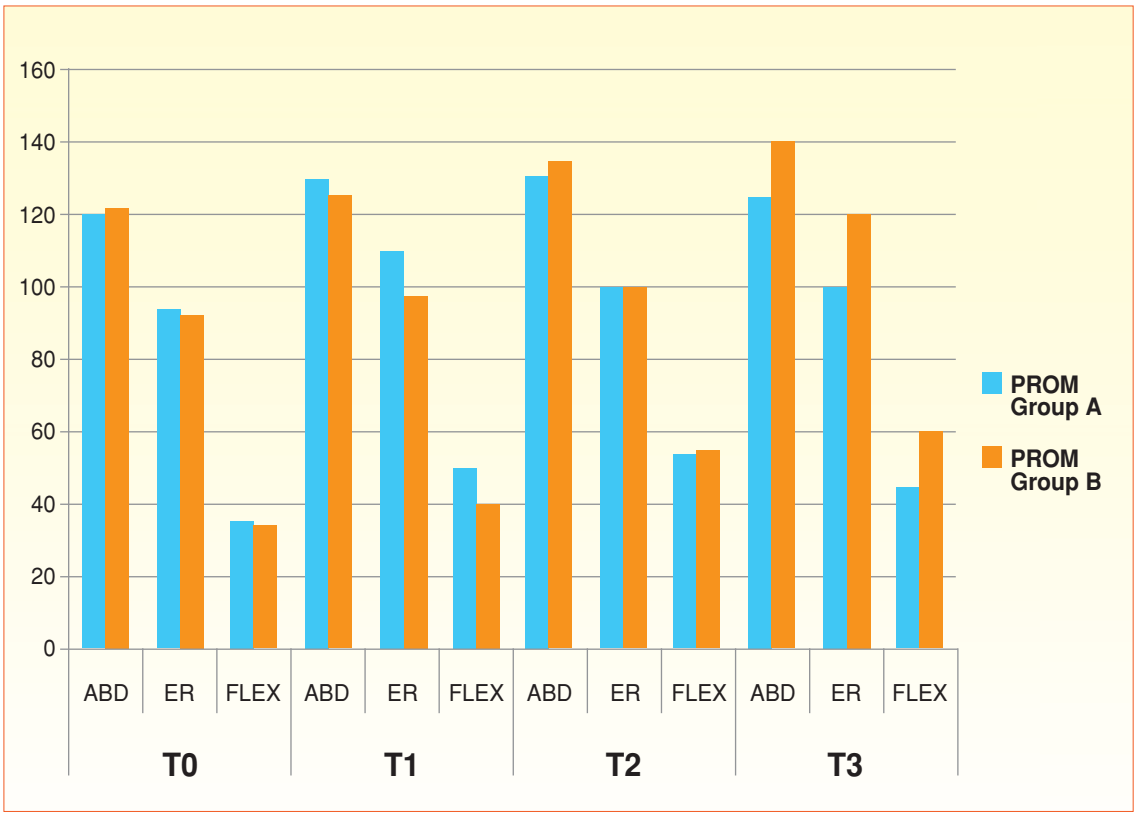
It is also necessary to remember that the clinical complexity of cases of SP may be due to the existence of multiple concurrent causes.

– In literature, the factors that may have an impact on the onset and evolution of SP are indicated as being the presence

FIG. 2

PROM (Passive Range of motion)

– Histograms representing the values presented in Fig. 1.



of severe motor damage (according to the Daniels Scale), significant changes in muscle tone in both the flaccidity and the hypertonic stages, and speech disorders (consistent with cognitive impairment).

Conventional treatment, which is not always satisfactory in clinical practice and is often conditioned by the fact that these patients are extremely frail, involves the prescription and use of **1)** upper limb orthoses, **2)** pharmacological therapy with analgesics, anti-inflammatories and a central muscle relaxant, **3)** peri/intra-articular injections with cortisone derivatives, and **4)** an adequate neuromotor rehabilitation protocol, with or without **5)** a combination of analgesic physiotherapy and functional electrical stimulation (FES).

Research conducted to optimise conservative rehabilitation treatment in post-stroke SP with an essentially musculoskeletal aetiopathogenesis (adhesive capsulitis) taking into consideration all the anatomical structures involved, has made it possible to formulate a number of considerations.

The use of medical devices for injection containing porcine collagen (Medical Device) allows a more effective and specific *in situ* positioning of the collagen, which serves a carrier and stabilisation function.

– This makes it possible to replace, strengthen, structure and protect (barrier against adhesion) cartilage, tendons, ligaments and joint capsules, consequently improving the status of the collagen fibres and all the other anatomical structures it contains and therefore to provide mechanical support to the affected anatomical segment.

MATERIALS AND METHODS

Therefore, the hypothesis on which our study was based was that injection treatment with **Guna MD-Shoulder** would recondition the compromised anatomical structure and improve the stability of the shoulder; a "combined" treatment can improve the functional outcomes of rehabilitation and/or produce better pain control in the subacute phase, as well as having a positive impact on the progression of the disease (less frequent exacerbations).

– We recruited **40 patients** undergoing ordinary hospitalisation in a Level II rehabilitation hospital for ischaemic stroke (transferred from acute hospital Stroke Units).
All patients complained of shoulder pain on the hemiplegic side that appeared in the first 3 months after the ischaemic event (SP appearing after 3 months is more often due to central hypersensitivity or CRPS).
The diagnosis of adhesive capsulitis was based on clinical findings and symp-

WBS – DAYTIME AND NIGHT-TIME PAIN

		GROUP A	GROUP B
T0	N	4,2	3,5
	D	7,1	6
T1	N	3,5	3
	D	4,2	5,2
T2	N	2,1	2,1
	D	4	4
T3	N	2,3	2,1
	D	6	3,2

FIG. 3

WBS (Wong-Baker Scale)
– Absolute values.

N – Night-time
D – Daytime

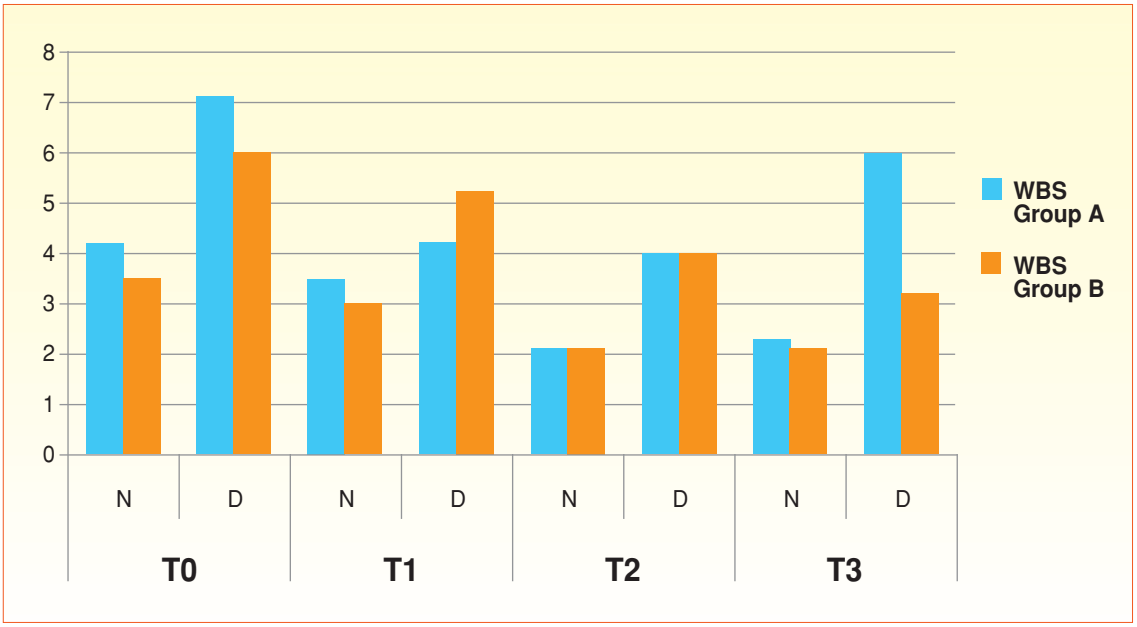


FIG. 4

WBS (Wong-Baker Scale)

– Histograms representing the values presented in Fig. 3.

N – Night-time
D – Daytime

toms, as well as standard X-ray and musculoskeletal ultrasound.

– Patients were randomised to **2** treatment groups (**Group A** and **Group B**), stratified by age, gender and pain intensity (Wong-Baker Scale). The outcomes were assessed at 1, 6, and 10 months.

– Inclusion criteria: F and M patients aged between 55 and 75 years who recently had a stroke; clinical and instrumental diagnosis of SP on the hemiplegic side due to adhesive capsulitis, from less than 3 months after the cerebral ischaemic event; WBS (Wong-Baker Scale) > 5, not using NSAIDs, cortisones or opiates.

– Exclusion criteria: past history of SP secondary to musculoskeletal conditions; prior shoulder and elbow fracture; rheumatoid arthritis; current diagnosis of rotator cuff tear and calcified tendinopathy; episodes of shoulder dislocation during the muscle flaccidity stage; serious comorbidity (CIRS 4); Parkinson's disease; dementia (evaluated using the Mini-Mental State Examination); severe neurological damage (emineglect*, speech disorders, Ashworth > 3 muscle hypertonus, severe residual motor damage according to the *Daniels Scale*); use of anticoagulants (warfarin or new oral anticoagulants); use of opiates or cortisone derivatives during the previous month; intra/peri-articular injections to the shoulder in the previous 3 months.

Both groups (A and B) received treatment with the same multidisciplinary rehabilitation protocol (inter-hospital therapeutic and diagnostic pathway) focussing on neuromotor treatment (mobilisation of the paralysed limb, facilitation of active neuromuscular unit recruitment, inhibition of muscle hypertonus and coordination of the inhibitory and excitatory activities of the agonist and antagonist muscles during the performance of the different motor tasks), neuropsychiatric treatment to stimulate the cognitive-motor afferences, ergonomic education and occupational therapy to recover activities of daily living and occupational activities.

The multidisciplinary rehabilitation treatment during the 60 days of ordinary hospitalisation was administered for 3 hours every day.
The patient then switched rehabilitation setting to a daily outpatient treatment with approximately one-hour sessions, for a total of 10 sessions.

• Both treatment groups (A and B) also received ultrasound-guided (Clarius Ultrasound portable linear probe) injection therapy.

Group A was treated with intra-articular injection of **Triamcinolone** 40 mg 1 vial and **Ropivacaine 2%** 3 mL (for a total volume of 4 mL) weekly for the first 2 weeks; the third treatment was administered 15 days after the second.

Group B was treated with injection of **Guna MD-Shoulder** 3 vials (for a total volume of 6 mL) intra-articularly (4 mL) and in the peri-capsular area (the remaining 2 mL).

The following were then analysed as clinical and functional outcomes **1)** daytime and night-time pain **(WBS)**; **2)** passive ROM **(PROM)** of the hemiplegic shoulder in anterior flexion **(FLEX)**, abduction **(ABD)** and external rotation **(ER)** (using a protractor), in addition to records of NSAID use during the follow-up period (FIGS. 1-4).

▶ The results obtained make it possible to conclude that in the multidisciplinary neuromotor rehabilitation protocol for ischaemic stroke patients, ultrasound-guided injection treatment with MD-Shoulder plays a decisive role when the complication known as SD, with a prevalent musculoskeletal aetiology (adhesive capsulitis), presents at an early stage.

Evidently the greater the residual neurological damage and the later the complication presents, the less effective the ultrasound-guided treatment will be, because other non-musculoskeletal causes (CRPS and central hypersensitivity) will sustain the pain symptoms.

CONSIDERATIONS

In the early stage, the injection treatment with cortisone derivative was undeniably effective on both the pain and the passive range of motion of the shoulder, before losing its beneficial effect over time.

On the other hand, in literature, the cortisone derivative is extensively reported as having a "toxic" effect on biological tissues with a prevalent collagen component.
Furthermore, the use of these medicinal products is potentially hazardous when they are used on a frail population such as that considered in this study.
In approximately half of all cases, patients experienced adverse effects such as blood pressure increases, onset of headache and facial rash. It goes without say that this treatment was not offered to diabetic subjects or those with poor glycaemia control.

– The injection treatment with Guna MD-Shoulder, on the other hand, did not give rise to any adverse reaction, confirming that it is absolutely safe.

The use of Guna MD-Shoulder made it possible to obtain a biological effect of organic reconditioning of the impaired anatomical structures, together with a hydraulic distension associated with the volume of product injected, making it possible to achieve a positive result on the stabilisation of the glenohumeral joint, its range of motion and, consequently, on the daytime and night-time pain symptoms, not only in the early stage, but especially in the weeks after the treatment, with a continuous improvement in the outcomes recorded at the follow-up time-points.

* **Ed. Emineglect**: Clinical deficits such as poor left visual exploration, inaccurate identification of the midpoint on a line, left limb hypokinesia and anosognosia. This kind of deficit is usually caused by right brain injury.

These results obviously allowed the patient to obtain greater benefit from the neuromotor rehabilitation treatment provided.

The injection treatment with MD-Shoulder would also appear to better control the progression of the shoulder condition, by reducing the frequency of exacerbations over time (control of the pro-inflammatory cytokine network).

– In coming months, it will be necessary to confirm the results achieved by expanding the study case load and, in particular, attempting to identify the correct timing for subsequent injection treatments as part of a personalised rehabilitation project (maintenance treatment). ■

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author

Dr. Edoardo Milano

– Specialist in Physical Medicine and Reabilitation

– Director, S.C. Medicina Fisica e Riabilitazione [Physical Medicine and Rehabilitation Unit], Presidio Sanitario San Camillo - Torino

Turin, Italy