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Shoulder Complaints in Patients With Reflex Sympathetic Dystrophy of the Upper Extremity

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ABSTRACT. Veldman PHJM, Goris RJA. Shoulder complaints in patients with reflex sympathetic dystrophy of the upper extremity. *Arch Phys Med Rehabil* 1995;76:239-42.

• Five hundred forty-one patients with reflex sympathetic dystrophy (RSD) of the upper extremity were prospectively studied. One hundred fifteen patients complained of pain and/or limited range of motion in the shoulder. Shoulder complaints more often occurred in women ($p = .01$); age and etiology were not different from patients with RSD without shoulder complaints. Physical examination showed a tendinitis of one or both tendons of the biceps muscle in 109 patients. Seventy one patients were treated with local injection of bupivacaine followed by methylprednisolone. This resulted in permanent relief of complaints in 34 patients, temporary or moderate relief in 31, no difference in 3, increase of complaints in 1 patient, and in 2 patients results were not documented. We conclude that shoulder complaints in RSD occur in a minority of patients and more often in female patients. There are no predisposing factors. The pathophysiologic mechanism for developing shoulder complaints remains unknown. In most cases complaints can be attributed to a bicipital tendinitis for which local injection of bupivacaine followed by prednisolone are both diagnostic and therapeutic.

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Reflex sympathetic dystrophy (RSD) is a clinical syndrome of which many aspects are still unknown. The syndrome is characterized by regional pain, edema, vasomotoric changes, limited active range of motion, and increase of these signs and symptoms after exercise. Many other signs and symptoms, especially neurological disturbances and atrophy of all tissues, may be present.¹ Complaints usually start after minor trauma or surgery, although many other precipitating events have been reported. In 5% of patients no luxating factor can be found.

The signs and symptoms are localized in the periphery of an extremity. Some authors report patients with RSD localized around a knee, hip, thoracic wall or even face though these presentations are rare. Also RSD can be present in more than one extremity.²

Many patients with RSD localized at the hand or wrist also have shoulder complaints. This coexistence is often called the shoulder-hand syndrome³ or the shoulder-hand-finger syndrome.⁴ The nature of the shoulder complaints is unknown. Facts concerning prevalence, clinical presentation, therapy, and prognosis are also needed for a better understanding of these shoulder complaints.

PATIENTS AND METHODS

Since we instituted an outpatient clinic for RSD in 1984 we have seen approximately 1,000 patients, mostly referred from other departments or hospitals with presumed or suspected diagnosis RSD of the upper extremity. All patients were prospectively studied for signs and symptoms.

RSD has not been clearly defined in literature. The following criteria were used for diagnosis (table 1). At least four of the five following signs and symptoms had to be present: unexplained diffuse pain in the extremity, a definite discoloration of the skin (abnormal redness, pallor, or cyanosis), diffuse edema, abnormal skin temperature, and limited active range of motion. These signs and symptoms had to increase after using the affected extremity. Furthermore, the previous signs and symptoms had to be present in an area much larger than the area of primary injury or surgery and necessarily including the area distant of the primary injury (for instance in Colles fractures, also the hand and fingers). The selection criteria used in this study approximate those, used in other studies concerning RSD⁵⁻⁸ and have been discussed in a previous study.¹

When shoulder complaints were present, special attention was given to the shoulder. If a tendinitis of one or both tendons of the biceps muscle was found, an injection with bupivacaine hydrochloride 0.25%^a followed by methylprednisolone acetate^b was given around the painful tendon(s).

Statistical analysis was performed by the Chi-square-test; $p < .05$ was considered significant.

RESULTS

During the study period (November 1984 to October 1993) 541 consecutive patients with RSD fitting into the criteria and localized in the upper extremity were studied. One hundred fifteen patients (21%) complained of pain in the shoulder at rest or during movements. When patients with shoulder complaints are compared with patients without shoulder complaints (table 2), shoulder complaints occurred more frequently in women ($p = .01$). Age and etiology did not differ between both groups. Twenty nine of 541 patients with RSD in the upper extremity were diagnosed with other diseases; 8 of these had shoulder complaints (twice diabetes mellitus, rheumatoid arthritis, epilepsy, amyotrophic lateral sclerosis, psychomotor attacks after cerebral aneurysm surgery, syringomyelia, psoriasis).

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Table 1: Diagnostic Criteria

Four or 5 of
Unexplained diffuse pain
Difference in skin color relative to other limb
Diffuse edema
Difference in skin temperature relative to other limb
Limited active range of motion
Occurrence or increase of above signs and symptoms after use
Previously mentioned signs and symptoms present in an area much larger than the area of primary injury or surgery and including the area distal to the primary injury

Physical examination showed a limited range of motion of the glenohumeral joint in all directions, that is a frozen shoulder in 6 patients. A painful arc during active abduction was never found. One hundred nine patients complained of diffuse pain in the shoulder area. At examination, if pressure exerted over one or both bicipital tendons of the biceps muscle provoked pain. Sleeping on the affected shoulder was not possible, and maximal extension together with endorotation of the shoulder, was uniformly painful. Twenty of these patients were seen only once for a second opinion or therapeutic advice. In 17 patients we did not institute a specific treatment because complaints were minor and self-limiting and one patient refused an injection. In 71 patients bupivacane hydrochloride followed by methylprednisolone acetate was injected surrounding the painful tendon (table 3). This immediately relieved pain in 65 patients. After injection, full range of motion in the glenohumeral joint was restored. In most patients these injections produced a temporary painful reaction during the first 48 hours, but if patients were warned this was always accepted. In 34 patients pain was permanently relieved with one or two injections. In 31 patients relief of pain was temporary or moderate. In two patients results were not documented, in one patient complaints increased, and in three patients no improvement was observed.

DISCUSSION

Kahlmeter⁹ reported in 1930 the coexistence of shoulder complaints with vasomotoric disturbances in the hand. During World War II several authors described patients suffering from ischemic heart disease, together with shoulder complaints, as well as swelling and vasomotor changes in the

Table 3: Results of Local Injection of Bupivacaine Followed by Methylprednisolone in Patients With Bicipital Tendinitis

Effect	n	%
Permanent relief	34	48%
Temporary or moderate relief	31	42%
No difference	3	4%
Increase of complaints	1	1%
Not documented	2	3%
Total	71	

hand.¹⁰⁻¹² In 1947 Steinbrocker¹³ distinguished this combination as a separate entity and called it the shoulder-hand syndrome. He also reported patients without ischemic heart disease. Since 1947 many authors reported patients with this syndrome.

Shoulder complaints exist of pain, stiffness, and/or limited range of motion. Limited range of motion may be passive or active because of pain. In severe cases a frozen shoulder can occur.¹⁴ Swelling or vasomotor changes in the shoulder area, characteristic features of RSD in the hand, have never been reported. Berger found several trigger areas around the shoulder girdle in 20 patients with postinfarctional shoulder-hand syndrome.¹⁵

Pathophysiology

The pathophysiological mechanism of this shoulder-hand syndrome is unknown. Why shoulder complaints occur together with complaints in the hand is not understood. Surprisingly, the joint in between, ie, the elbow, seems to be free of symptoms. Segmental influences were suggested but never have been proven.¹⁶ As the signs and symptoms in the hand and the shoulder are clearly different, this suggests two different pathophysiological mechanisms. Because the pathophysiological mechanism of RSD is still unknown we shall discuss shoulder complaints only.

Some authors suggest that in patients with shoulder-hand syndrome other factors are present, in contrast to RSD without shoulder complaints, because the shoulder-hand syndrome more often occurs in patients with other diseases,^{14,17,18} such as spastic hemiplegia,^{14,19,20,21} cervical spondylosis,^{14,17,18} or in patients using barbiturates^{22,23} or tuberculostatics.²³⁻²⁵ An increased incidence of shoulder-hand syndrome in these diseases has never been proven in a prospective study. We found associated diseases in only three patients and neurological disorders in four patients, of which one was treated with barbiturates. Besides the increased prevalence of women with shoulder complaints, we could not find differences between RSD patients with and without shoulder complaints, especially age and etiology were not different in between groups. We conclude that there is no evidence for the presence of predisposing factors for shoulder complaints developing in RSD patients.

Moberg suggested immobilization as a mechanism responsible for the development of shoulder complaints in RSD.²⁶ If immobilization alone is responsible for shoulder complaints, one would expect a higher incidence of shoulder complaints in flaccid paresis, which is not the case. On the contrary, shoulder complaints develop more frequent in spastic paresis.²¹ Ernstene stated that symptoms develop as a

Table 2: Differences Between Patients With and Without Shoulder Complaints

	With Shoulder Complaints	Without Shoulder Complaints
n	115	426
Age (median)	12-75 (47)	13-84 (47)
Female patients (%)	99 (86%)*	317 (74%)
Etiology		
Trauma	70 (61%)	288 (68%)
Surgery	24 (21%)	79 (18%)
Diverse	6 (5%)	26 (6%)
Spontaneous	15 (13%)	33 (8%)
Coexistent pathology	8 (7%)	21 (5%)

* Chi-Square: $p = .01$ (Yates corrected).

result of relative disuse of the shoulder and abnormal tension of the muscles of the shoulder girdle; possibly as a protecting mechanism against pain triggers.¹² If this mechanism is true, then complaints must first develop in the hand and later in the shoulder. In contrast to this, some authors report the synchronous development of complaints in shoulder and hand, or even first in the shoulder.^{14,17,23} Unfortunately, we did not document the time between the start of complaints in hand and shoulder, though we recall that in most patients complaints started in the hand, followed sometimes after several months or years by shoulder complaints.

In most of our patients, a tendinitis of one or both tendons of the biceps muscle was diagnosed. Bicipital tendinitis is diagnosed on clinical signs and symptoms. Pain is often localized over the anterior aspect of the shoulder, though it may irradiate distally to the biceps belly or proximally to the shoulder surface or trapezius area. Pain can be elicited by isometrical contraction, supination of the forearm and flexion of the elbow in a 90° flexed position, and/or by pressure exerted by the investigator at the bicipital groove or just distal of the coracoid process. Other tests have been described²⁷ but sensitivity and specificity of these tests are unknown. Roentgenograms, arthrography, ultrasonography, or computerized tomography do not contribute to the diagnosis but can be helpful in ruling out other disorders.^{27,28} Local infiltration with an anesthetic agent surrounding the painful tendon may relieve the pain within minutes, which helps in establishing the diagnosis. In general, bicipital tendinitis is caused by degenerative changes, chronic tension, or chronic inflammation caused by anatomic variations, repeated trauma, or secondary to cuff lesions.^{27,29,30} Chronic tension or inflammation may cause microtears and swelling of a tendon. Cellular infiltration, increased vascularity, and a localized synovial reaction may contribute to tendon swelling.^{28,30} Therefore, chronic tension may be responsible for the development of a bicipital tendinitis in patients with RSD of the upper extremity.

Therapy

Many therapies have been described for shoulder complaints in RSD. Probably, a majority of the shoulder complaints are self-limiting.²⁶ Steinbrocker and Neustadt³¹ reported disappearance of shoulder complaints in 8 of 9 untreated patients, whereas disability of the hand remained in 7 of 9 patients. We found minor shoulder complaints in 17 of 89 patients, which all proved self-limiting in time.

For chronic bicipital tendinitis of the long head in non-RSD patients, a tenodesis has been advocated as treatment, but long-term results are poor.³²

Local injections with corticosteroids are a popular form of therapy in musculoskeletal disorders.³³ They have been prescribed for tendinopathies and shoulder complaints with varying results. Complications are rare.³⁴ In case of a shoulder-hand syndrome, we found one report: Berger injected hydrocortisone (compound F) without local anesthetics in trigger areas in the shoulder girdle and reported good results after 1 to 4 injections in all 20 patients.¹⁵ Injections should be administered in aseptic conditions and not into the tendon or joint but surrounding the painful tendon or into the tendon sheath.³⁵ Repeated injections are possible, but if the first

injection did not relieve pain, there is no reason to expect a second or third injection would do better. In our patients 92% responded with permanent or temporary improvement to injection with bupivacaine followed by methylprednisolone. Although prospective controlled studies are necessary to estimate the value of this treatment we consider these injections as extremely helpful in both diagnosis and therapy.

CONCLUSIONS

Shoulder complaints in patients with RSD of the upper extremity occur in a minority of patients and more frequently in women. We do not consider the shoulder-hand syndrome to be a specific entity identifiable from RSD of the upper extremity. The pathophysiological mechanism remains unknown, though in the majority of patients complaints can be attributed to a tendinitis of one or both tendons of the biceps muscle. One or more injections with bupivacaine followed by methylprednisolone are both diagnostic and therapeutically successful.

References

1. Veldman PHJM, Reynen HM, Arntz IE, Goris RJA. Signs and symptoms of reflex sympathetic dystrophy: prospective study of 829 patients. *Lancet* 1993;342:1012-6.
2. Veldman PHJM, Goris RJA. Multiple reflex sympathetic dystrophy; which patients are at risk for developing a recurrence in the same or another extremity. Pain (submitted).
3. Steinbrocker O, Spitzer N, Friedman HH. The shoulder-hand syndrome in reflex dystrophy of the upper extremity. *Ann Intern Med* 1948;29:22-52.
4. Moberg E. The Shoulder-Hand-Finger Syndrome. *Surg Clin North Am* 1960;40:367-73.
5. Kozin F, Soin JS, Ryan LM, Carrera GF, Wortmann RL. Bone scintigraphy in the reflex sympathetic dystrophy syndrome. *Radiology* 1981;138:437-43.
6. Christensen K, Jensen EM, Noer I. The reflex dystrophy syndrome. Response to treatment with systemic corticosteroids. *Acta Chir Scand* 1982;148:653-5.
7. Poplawski ZJ, Wiley AM, Murray JF. Post-traumatic dystrophy of the extremities. A clinical review and trial of treatment. *J Bone Joint Surg (Am)* 1983;65:642-55.
8. Atkins RM, Duckworth T, Kanis JA. Features of algodystrophy after Colles' fracture. *J Bone Joint Surg (Br)* 1990;72:105-10.
9. Kahlmeter G. Form of omarthritis accompanied by vasomotor disturbances in corresponding hand and anxiety neurosis. *Acta Rheum* 1930;2:20-2.
10. Askey JM. The syndrome of painful disability of the shoulder and hand complicating coronary occlusion. *Am Heart J* 1941;22:1-12.
11. Johnson AC. Disabling changes in the hands resembling sclerodactylea following myocardial infarctions. *Ann Intern Med* 1943;19:433-56.
12. Ernstene AC, Kinell J. Pain in the shoulder as a sequel to myocardial infarction. *Arch Intern Med* 1940;66:800-6.
13. Steinbrocker O. The shoulder-hand syndrome. Associated painful homolateral disability of the shoulder and hand with swelling and atrophy of the hand. *Am J Med* 1947;3:402-7.
14. Rosen PS, Graham W. The shoulder-hand syndrome: historical review with observations on 73 patients. *Can Med Assoc J* 1957;77:86-91.
15. Berger H. The treatment of postmyocardial infarction shoulder-hand syndrome with local hydrocortisone. *Postgrad Med* 1954;15:508-11.
16. Campbell SM. Referred shoulder pain. *Postgrad Med* 1983;73:193-203.
17. Steinbrocker O. The shoulder-hand syndrome: present perspective. *Arch Phys Med Rehabil* 1968;49:388-95.
18. Pak TJ, Martin GM, Magness JL, Kavanaugh GJ. Reflex sympathetic dystrophy. Review of 140 cases. *Minn Med* 1970;53:507-12.
19. Davis SW, Petrillo CR, Eichberg RD, Chu DS. Shoulder-hand syndrome in hemiplegic population: 5-year retrospective study. *Arch Phys Med Rehabil* 1977;58:353-6.

20. Tepperman PS, Greyson ND, Hilbert L, Williams JI. Reflex sympathetic dystrophy in hemiplegia. *Arch Phys Med Rehabil* 1984;65:442-7.
21. Ouwenaller C van, Laplace PM, Chantraine A. Painful shoulder in hemiplegia. *Arch Phys Med Rehabil* 1986;67:23-6.
22. Acquaviva P, Schiano A, Harnden P, Cros D, Serratrice G. Les algodystrophies: terrain et facteurs pathogeniques. Resultats d'une enquete multicentrique portant sur 765 observations (Rapport). *Rev Rhum Mal Osteoartic* 1982;49:761-6.
23. Korst JK van der, Cats A. Het schouder-hand-syndroom. Een retrospectief onderzoek van 75 gevallen. *Ned Tijdschr Geneesk* 1967;111:723-8.
24. McKusick AB, Hsu JM. Clinical and metabolic studies of the shoulder-hand syndrome in tuberculous patients. *Arthritis Rheum* 1961;4:426.
25. Good AE, Green RA, Zrafonetis CJD. Rheumatic symptoms during tuberculous therapy. *Ann Intern Med* 1965;63:800-7.
26. Moberg E. The shoulder-hand-finger syndrome as a whole. *Acta Chir Scand* 1955;109:284-92.
27. Curtis AS, Snyder SJ. Evaluation and treatment of biceps tendon pathology. *Orthop Clin North Am* 1993;24:33-43.
28. Post M, Benca P. Primary tendinitis of the long head of the biceps. *Clin Orthop Rel Res* 1989;246:117-25.
29. Neer CS II. Anterior acromioplasty for the chronic impingement syndrome in the shoulder. A preliminary report. *J Bone Joint Surg (Am)* 1972;54:41-50.
30. Uhthoff HK, Sarkar K. Classification and definition of tendinopathies. *Clin Sports Med* 1991;4:707-20.
31. Steinbrocker O, Neustadt D. Shoulder-hand syndrome. Sympathetic block compared with corticotropin and cortisone therapy. *J Am Med Assoc* 1953;153:788-91.
32. Becker DA, Cofield RH. Tenodesis of the long head of the biceps brachii for chronic bicipital tendinitis. Long term results. *J Bone Joint Surg (Am)* 1989;71:376-81.
33. Goldie I. Local steroid therapy in painful orthopaedic conditions. *Scot Med J* 1972;17:176-86.
34. Halpern AA, Horowitz BG, Nagel DA. Tendon ruptures associated with corticosteroid therapy. *West J Med* 1977;127:378-82.
35. Rowe CR. Injection technique for the shoulder and elbow. *Orthop Clin North Am* 1988;19:773-7.

Suppliers

- a. Marcaine; Sanofi Winthrop Pharmaceuticals, New York, NY.
- b. Depo-Medrol; Upjohn Company, Kalamazoo, MI.