



Adhesive Capsulitis in Diabetic Patient Treated with Manual Therapy and Closed Kinematic Exercise – An Evidence Based Study

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Abstract

Introduction: Prolonged posture related soft tissue pain are common among desk work nature of job. Pain and reduction in use of arm can give rise to diminished daily activities and quality of life aims and objectives of this subject with adhesive capsulitis (Right) Shoulder was to analyse the combined effect of manual therapy and CKC exercises.

Aims & Objective of this original case study was a) To Evaluate the efficacy of manual therapy and closed kinematic chain exercises, using shoulder functional index.

Materials & Methodology: Geriatric type II diabetic with hba_{1c} of 8.2% was treated with specific manual therapy closed and kinematic chain exercises for right shoulder pain and restricted usage of the arm. In 6 sessions pain and improved usage of (Shoulder) right arm was recorded and analysed using due statistical means

Results: Shoulder functional index was improved with $P < .05$

Conclusion: Selection of suitable means of therapy should be time conserving, effective and evidenced. Posture related soft tissue tightness of shoulder where advanced exercises modalities were more productive than symptom based therapy with electrotherapy.

Keywords: PNF, Shoulder Functional Index, Adhesive Capsulitis, CKC, hba_{1c} .

Introduction

Adhesive Capsulitis appears to be twice as common in diabetic patients. This clinical condition where a stiffened glen humeral joint caused by thickening and contraction of the joint capsule, resulting in shoulder stiffness, decreased range and motion and pain, although the pain of this condition is typically less than that of general population (Mavrikakis et al 1989). AC occurs at earlier age in patients with diabetes and usually less painful (Figuerola et al 2007)

Diabetes mellitus is a multisystem disease characterised by persistent hyper glycemia that has both acute and chronic biochemical and anatomical sequel. It is important for the clinicians to recognise the effects of diabetic mellitus on musculoskeletal system so as to make more appreciate clinical decisions regarding therapy in these patients, including contra indications to therapy and referring patients to physicians when appropriate (Wyatt & Ferrance 2006). Also to understand the impact that diabetic mellitus may

have on the prognosis for the patients suffering from myriad musculoskeletal conditions associated with this disease, also as health care providers to provide counselling to promote physical activity, a healthy diet and smoking cessation as part of preventive health care (Hawk et al 2001) Complications of diabetes mellitus are numerous and include the involvement of the musculoskeletal system (Smith et al 2008)

Exercise is considered to be one of the three cornerstones of optimal diabetic treatment along with diet and pharmacotherapy (Joslin et al 1959) and a recent meta analysis has shown that exercises training in diabetic type II patients reduces hba_{1c}, that should reduce the risk of complications (DCCTRG 1993) without any greater changes in body mass (Boule et al 2001).

Adhesive capsulitis, where gleno humeral joint is stiffened caused by the thickening and contraction of the joint capsule which results in a substantial decrease in capsular volume capacity. Patients report shoulder stiffness along with decreased range of motion and pain, with abduction and external rotation the worst affected. Physiotherapy with minimizing of the shoulder (Neviaser & Henafin 2010) and the use of analgesics and or intra articular injections (Andersen 2010)

Background Information

Mr. XXXX, 62 year old Male gives H/O Hypension and type II diabetic, getting treated with T. Amlong, Glycomet 100 mg and T. Concord with his blood glucose profile at FBS: 166 mg, PPBS: 275 mg, hba_{1c} – 85% as on 15.09.2016

Anthropometric & Physical Parameters:

Height: 157 Cm

Waist Circumference: 98 cm

Weight: 80 Kg

Heart Rate: 84 /mt

Blood Pressure: 130/86 mm/hg

Sedentary life style being a chartered accountant, vegetarian, non smoker, non alcoholic, endomorph, intermittently goes for walking

C/O

Pain in right shoulder since two weeks and difficulty in using for daily activities

O/E

- Right shoulder beyond 90⁰ of all directions painful and restricted
- Obliterated cervical lordosis
- Nil radicular symptoms
- Bilateral hand grip good
- Left shoulder, both elbows, wrist and fingers full and free with range of motion with nil motor deficit
- Anteverted right shoulder
- End range cervical spine mild restriction with pain
- Abdominal muscle weakness II/ V
- Other peripheral joints nil deficit
- Moderate level of exercise tolerance
- Quadrant test positive

Provisional Diagnosis:

Capsulitis?

Retator Cuff Lesion?

Aims & Objectives of this original case presentation was to analyse the impact of CKC and PA glide using shoulder functional disability index

Treatment Given

- I. Strengthening exercises to shoulder, scapula muscles with closed kinematic chain exercises means using manual resistance and Physioball
- II. Shoulder bracing exercises
- III. Hold relax, irradiation concepts of Proprioceptive neuromuscular facilitation
- IV. Posterior anterior glide to right shoulder
- V. In six sessions of exercises with a duration of 30 minutes, the subjects range of motion has improved and functional activities restored. Profuse sweating was recorded with each session and heart rate was used to monitor the intensity of exercises

Table results on the subjects shoulder functional index using student't' test

Student 't'	SD	SE	t	P
Test	12.70	7.33	3.02	<.05

Discussion

- a. Right shoulder pain and movement restriction and association with diabetes mellitus?
- b. Adhesive capsulitis and diabetes relates?
- c. Does electrical modalities are useful in posture, soft tissue tightness of upper extremities?
- d. Are closed kinematic chain exercises effective among shoulder conditions?
- a. When the control of diabetes is poor, higher levels of complications result, indicating poor glycemic control, (DC and 3 complicated trails research group 1993). Shoulder manifestations of diabetes mellitus includes adhesive Capsulitis, reflex sympathetic dystrophy, diabetic amyotrophy, osteoarthritis of the shoulder (Garcilazo et al 2010). Muscle infarction with clinical presentation of pain, swelling and tenderness for days to weeks. The affected muscle groups as micro vascular complications are typical with diabetic mellitus in properly controlled diabetic with no history of trauma (Casteels 2003). Levine et al 2007 success rate with non operative treatment (Oral NSAID and standardized physical therapy) over an average period of 4 months
- b. Adhesive Capsulitis, most disabling of the common musculoskeletal problems, where progressive, painful restriction of shoulder movements especially, external rotation and abduction (Reeves 1975) although it responds less well to treatment and lasts longer (Griggs et al 2000) and its estimated prevalence is 11-30% in diabetic patients and 2-10% in non diabetics (Balci et al 1999) also this conditions associated with duration of diabetes and age (Arkilla et al 1996). Hydroxyapatite deposition disease is seen three times incidence in diabetic subjects than general population, also known as calcific tendonitis

and calcific per arthritis. These patients presents with pain and decreased range of the shoulder (Bottorff & Hansten 2000). Adhesive Capsulitis has been reported in approximately 20% of diabetic patients (Wyatt & Ferrance 2006) and diabetic subjects with AC are more likely to have other diabetic complications such as limited joint mobility with ageing (Balci et al 1999). Treatment is directed at increasing range of motions and decreasing pain through use of mobilisation, physical therapy modalities and therapeutic exercises (Teasdale et al 2004). Shoulder movement due to pain, stiffness or weakness can cause substantial disability and affect a persons ability to carry out daily activities and work (Urwin et al 1998) and is the third most common cause of musculoskeletal consultation in the primary care (Winter et al 1999) diabetic subjects with AC have worse functional outcomes as measured by disability and quality of life questionnaires compared to non diabetics (Griggs et al 2000)

- c. In a four week intervention on muscle strength and function of shoulder were recorded by (Jurget et al 2005 & Sokk et al 2007) in reducing pain and improving strength of shoulder, where as further follow up as recorded in this study, which is on going with the same subject by the author. Use of modalities such as massage, ultrasound, iontohoresis and phono phoresis have not proven to be beneficial in AC but TENS and low power LASER therapy to increase ROM more than heat combined with exercise and manipulation (Rizk et al 1983). Deep heating with diathermy combined with stretching was shown to be more effective than superficial heating for treating shoulder patients with AC (Leung & Cheing 2008)
- d. Jewell 2013 in a meta analysis of physical therapy innervations in AC with modalities, manual techniques and therapeutic exercises. Effectiveness of joint mobilization in AC

was established in (Johnson et al 2007) in particular posterior glide mobilization was determined to be more effective than anterior glide for improving external rotation in 3 sessions in a subject with AC (Vermeulen et al 2006). This study subject as shown in results has improved in a sessions in concurrence with above report.

Conclusion

Best therapeutic adoption with evidence for quicker recovery the line of physiotherapy practice based on the evaluation, under lying patho mechanics and medical condition. The major purpose of this presentation was whenever possible therapy should be aim at the correction of cause and not to reduce the symptoms, which will uphold quality of once practice and standard of the physiotherapy.

Limitations of this presentation was single case was studied, for a shorter duration and only shoulder functional index was analysed further studies with larger sample size, including other measurable parameters such as NMRI, longer duration follow up including control groups and comparing with other exercise/ electrotherapy modalities. The author doesn't have any conflict while publishing this original case study.

References

1. Mavrikakis ME, Drimis S, Kontoyannis DA, Rasidakis A, Mouloupoulou ES, Kontoyannis S. Calcific shoulder periartthritis (tendinitis) in adult onset diabetes mellitus: a controlled study. *Ann Rheum Dis*. 1989 Mar;48(3):211–214.
2. Figueroa A, Baynard T, Fernhall B, Carhart R, Kanaley JA: Endurance training improves post-exercise cardiac autonomic modulation in obese women with and without type 2 diabetes. *Eur J Appl Physiol* 2007;100(4):437–44
3. Wyatt, Ferrance. The musculoskeletal effects of diabetes mellitus. *J Can Chiropr Assoc* 2006; 50(1): 43-50
4. Hawk C, Long C, Boulanger K. Prevalence of nonmusculoskeletal complaints in chiropractic practice: report from a practice-based research program. *JMPT* 2001; 24(3):157–169.
5. Smith, S P Burnet, J D McNeil. Musculoskeletal manifestations of diabetes mellitus. *Br. J. Sports Med*. 2003;37;30-35
6. Joslin EO, Root EF, White P. The treatment of diabetes mellitus. Philadelphia: Lea & Febiger 1959.
7. Diabetes Control and Complications Trial Research Group, Nathan DM, Genuth S, Lachin J, Cleary P, Crofford O, Davis M, Rand L, Siebert C. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med*. 1993 Sep 30;329(14):977-86.
8. Boulé NG, Haddad E, Kenny GP, Wells GA, Sigal RJ. Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. *JAMA*. 2001 Sep 12; 286(10):1218-27.
9. Neviaser AS, Hannafin JA. Adhesive capsulitis: a review of current treatment. *Am J Sports Med*. 2010 Nov;38(11):2346-56. doi: 10.1177/0363546509348048. Epub 2010 Jan 28.
10. Andersen LØ, Husted H, Kristensen BB, Otte KS, Gaarn-Larsen L, Kehlet H. Analgesic efficacy of intracapsular and intra-articular local anaesthesia for knee arthroplasty. *Anaesthesia*. 2010 Sep;65(9): 904-12. doi: 10.1111/j.1365-2044.2010.06389.x.
11. Garcilazo C, Cavallasca JA, Musuruana JL. Shoulder manifestations of diabetes mellitus. *Curr Diabetes Rev*. 2010 Sep;6(5):334-40.
12. Casteels K. Rhabdomyolysis in diabetic ketoscidosis. *Pediatr Diabetes*. 2003;4 (1):29–31.

13. Levine W. N., et al. Nonoperative management of idiopathic adhesive capsulitis. *J Shoulder Elbow Surg.* 2007; 16:569–573
14. Reeves B. The natural history of the frozen shoulder syndrome. *Scand J Rheumatol.* 1975; 4:193–196
15. Griggs SM, Ahn A, Green A. Idiopathic adhesive capsulitis. A prospective functional outcome study of nonoperative treatment. *J Bone Joint Surg [Am]* 2000;82:1398–407
16. Balci N, Balci MK, Tuzuner S. Shoulder adhesive capsulitis and shoulder range of motion in type II diabetes mellitus: association with diabetic complications. *J Diabetes Complications* 1999;13:135–40
17. Arkkila PE, Kantola IM, Viikari JS, et al. Shoulder capsulitis in type I and II diabetic patients: association with diabetic complications and related diseases. *Ann Rheum Dis* 1996;55:907–14
18. Bottorff M, Hansten P. Long-term safety of hepatic hydroxymethyl glutaryl coenzyme A reductase inhibitors: the role of metabolism-monograph for physicians. *Arch Intern Med.* 2000; 160:2273–2280.
19. Teasdall R, Smith B, Koman L. Complex regional pain syndrome (reflex sympathetic dystrophy) *Clin Sports Med.* 2004;23:145–155.
20. Urwin M, Symmons D, Allison T, Brammah T, Busby H, Roxby M, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis* 1998;57: 649-55.
21. Winters JC, Sobel JS, Groenier KH, Arendzen JH, Meyboom-de Jong B. The long-term course of shoulder complaints: a prospective study in general practice. *Rheumatology* 1999;38: 160-3.
22. Jürgens H, Haass W, Castañeda TR, Schürmann A, Koebnick C, Dombrowski F, Otto B, Nawrocki AR, Scherer PE, Spranger J, Ristow M, Joost HG, Havel PJ, Tschöp MH. Consuming fructose-sweetened beverages increases body adiposity in mice. *Obes Res.* 2005 Jul;13(7):1146-56.
23. Sokka T, Kautiainen H, Toloza S, Mäkinen H, Verstappen SM, Lund Hetland M, Naranjo A, Baecklund E, Herborn G, Rau R, Cazzato M, Gossec L, Skakic V, Gogus F, Sierakowski S, Bresnihan B, Taylor P, McClinton C, Pincus T; QUEST-RA Group. QUEST-RA: quantitative clinical assessment of patients with rheumatoid arthritis seen in standard rheumatology care in 15 countries. *Ann Rheum Dis.* 2007 Nov;66(11):1491-6. Epub 2007 Apr 5.
24. Rizk TE, Christopher RP, Pinals RS, Higgins C and Frix R (1983), Adhesive capsulitis (Frozen shoulder), A new approach to its management, *Archives of Physical Medicine and Rehabilitation*, 62, 29-33
25. Leung MS, Cheing GL. Effects of deep and superficial heating in the management of frozen shoulder. *J Rehabil Med.* 2008 Feb;40(2):145-50. doi: 10.2340/16501977-0146.
26. Jewell D, Moore J, Goldstein M. Delivering the Physical Therapy Value Proposition: A Call to Action. *Physical Therapy.* 2013;93 (1):104–114.
27. Johnson A, Godges J, Zimmerman G, Ounanian L. The effect of anterior versus posterior glide joint mobilization on external rotation range of motion in patients with shoulder adhesive capsulitis. *J Orthop Sports Phys Ther.* 2007;37:88–99.
28. Vermeulen H, Rozing P, Obermann W, et al. Comparison of high-grade and low-grade mobilization techniques in the management of adhesive capsulitis of the shoulder: Randomized controlled trial. *Phys Ther.* 2006;86:355–368.