Shoulder Joint Capsule Distension (Hydroplasty)

A Case Series of Patients with "Frozen Shoulders" Treated in a Primary Care Office

LARRY HALVERSON, MD, AND RICH MAAS, PT
Springfield, Missouri

"Frozen shoulder," most often caused by adhesive capsulitis, is frequently treated with intra-articular steroid injections, physical therapy, and surgical manipulation under anesthesia. These therapies provide limited benefits. Hydraulic distension of the shoulder joint capsule (hydroplasty) has potential to provide rapid relief of pain and immediate improvement of shoulder function for patients with adhesive capsulitis. We performed 21 hydroplasty procedures on 16 patients over a 4-year period. Ninety-four percent (17/18) of the procedures improved patients' measured mobility immediately after the procedure. Fifty-three percent (10/19) of the procedures produced immediate, short term, and sustained improvement in comfort and function. No significant complications of the procedure were detected. Our series suggests that the hydroplasty procedure should be further evaluated.

■ KEY WORDS Adhesive capsulitis; frozen shoulder [non-MeSH]; hydraulic distension [non-MeSH]; hydroplasty [non-MeSH]; shoulder pain [non-MeSH]. (*J Fam Pract 2002; 50:61-63*)

"Frozen shoulder" is a clinical diagnosis frequently made for patients with shoulder pain and limited motion. Adhesive capsulitis is the most likely cause of the frozen shoulder syndrome in middle-aged adults.[1] This pathophysiologic process involves joint capsular contraction from intraarticular adhesion of synovial folds. The medical literature frequently regards frozen shoulder and adhesive capsulitis as synonyms.

Although many treatment options have been proposed for the frozen shoulder syndrome, each has limitations. Home exercises may not improve the rate of natural recovery.[2,3] Benefits from intensive physical therapy are slow.[4] Manipulation while anesthetized can be effective, but significant complications have been documented and publications report protracted recovery.[5] Injection of intraarticular steroids may benefit some patients, but this hypothesis is based on few quality studies.[4,6] Arthroscopic release done under general anesthesia is invasive and few patients' outcomes are reported.[7,8]

An infrequently cited option is hydraulic joint capsule distension under local anesthesia (hydroplasty). This is an office technique without arthrography, and was initially reported by Fareed and Gallivan[9] in a case series of 20 patients. The patients in this report noted immediate pain resolution, return to normal sleep, and return of normal function. Benefits persisted for up to 10 years. Variations of this intervention are described in the orthopedic literature and results are favorable.[10,11] We found no publications addressing the use of hydroplasty in a primary care office. In this study, we performed this procedure on a series of patients in a family medicine residency clinic.

METHODS

Enrollment and Data Collection

We offered hydroplasty to a group of patients suffering from stiff and painful shoulders with limited range of motion (ROM) in a capsular pattern (reduced external rotation, abduction, and internal rotation) and pain in the C5 dermatome that had persisted for at least 1 month.[12] Informed consent was obtained from patients who underwent the procedure.

Demographic and medical information was collected for all participants. One of the authors (RM) or a trained associate systematically measured pre- and post-procedure ROM on 18 of 21 procedures. Because of scheduling difficulties, 3 patients were not measured immediately before and after the procedure. Hydroplasty procedures were performed or supervised by the other author (LH). Subsequent

•Submitted, revised, June 11, 2001.
From the Family Practice Residency Program (L.H.) and the Department of Sports Medicine and Rehabilitation (R.M.), Cox Health Systems. Reprint requests should be addressed to Larry W. Halverson, MD, Cox Family Practice Residency Program, 1423 N Jefferson Ave Ste A100, Springfield, MO 65802. E-mail: lhalver@coxnet.org.

TABLE

ROTATION CHANGES FOLLOWING HYDROPLASTY PROCEDURE

Procedure Number	Patient (Shoulder Treated)	Duration of Symptoms, in Months	Change in ROM	Immediate Function Benefit	Immediate Effect on Pain*	Pain at 1 to 6 Weeks*	Prolonged Benefit † (Months)
1	A (L)	4	NM	Y	↓	↓	Y (55)
2	B (L)	3	+50	Y	↓	↓	Y (41)
3	B (R)	3	+35	Y	→	↓	Y (40)
4	C (R)	8	+30	Y	↓	↓	Y (36)
5	D (R)	60	+25	Y	↓	↓	N
6	E (L)	6	NM	Y	↓	Lost	Lost
7	F (R)	12	NM	Y	↓	↓	Y (30)
8	G (L)	8	+30	Y	↓	↓	Y (4)
9	H (R)	19	+20	Y	→	↓	N
10	I (L)	84	-35	N	↑	↑	N
11	G (L)	8	+50	Y	↓	↓	Y (25)
12	J (R)	7	+25	Y	↓	↓	Y (1)
13	J (R)	8	+5	N	↑	↑	D
14	A (R)	3	+45	Y	↓	↓	Y (16)
15	K (L)	3	+25	N	↑	↑	N
16	L (R)	4	+30	Y	→	↓	N
17	M (L)	4	+20	Y	→	→	N
18	L (R)	7	+30	N	↑	↑	N
19	N (R)	1	+20	N	→	→	N
20	O (L)	4	+20	Y	→	↓	Y (7)
21	P (L)	6	+10	Y	↓	↓	N
Summary Results	16 patients; 21 treatments	Average = 12.5 months	17/18 (94%) increased ROM	16/21 (76%) improved function	11/21 (52%) immediate relief	15/20 (75%) relief at 1-6 weeks	10/19 (53%) prolonged benefit

NM denotes not measured; Lost, lost to follow-up.
*Pain abbreviations: ↓=Pain decreased; →=Pain was unchanged; ↑Pain increased.
† Y denotes yes; N, no; D, deceased.

information was collected during consultations after the procedure. Prior to this report, current shoulder status was assessed by telephone.

Hydroplasty Technique

The hydroplasty procedure we used was adapted from Fareed.[9] The anterior shoulder is prepped with the patient in a supine position. The affected humerus is externally rotated as tolerated. The glenohumeral crease is palpated to identify a subcoracoid window to enter the joint space. The skin is anesthetized using 1% lidocaine. The joint space is entered with an 18-gauge 1.5-inch needle angling slightly medially and superiorly, pointing toward the presumptive center of the glenoid fossa. Once the joint space is entered, approximately 5 ml of 1% lidocaine is injected. Minimal plunger resistance during this injection helps ensure joint space entry. With a severely contracted joint capsule, more plunger resistance may be encountered. One ml of triamcinolone (40 mg) is injected. Then up to 40 ml of sterile, chilled saline are forcibly injected into the joint space using 10-ml increment syringes. Clear fluid efflux from the needle is usually seen when syringes are changed. A sensation of reduced resistance to injection during saline injection suggests capsular distension or rupture.

RESULTS

The hydroplasty procedure was offered and performed on 21 shoulders of 16 patients over 4 years. Subjects ranged in age from 37 to 76 years. Eleven female and 10 male shoulders were treated. Two patients had both shoulders treated, and 3 patients had the same shoulder treated on 2 separate occasions. One or both of the authors reevaluated 15 of 16 patients approximately 1 week (range 1 to 6 weeks) subsequent to the procedure.

ROM increased immediately post-procedure in 17 of 18 procedures in which measurements were recorded. The sum of changes in external rotation and internal rotation is reported in the Table. One patient experienced decreased ROM following a painful injection, but return to baseline of pain, motion, and function occurred within 24 hours.

Functional improvement was defined as the ability to accomplish a specific task that had been impossible prior to the procedure. Example functions included combing hair, putting an arm around a spouse, freestyle swimming, and reaching into a back pocket.

Pain relief was immediate in 11 of 21 shoulders. Temporary injection pain occurred in some procedures but injection pain resolved spontaneously. Significant pain relief was reported approximately 1 week following the procedure in 15 of 21 treatments.

Sustained benefits were confirmed by a telephone survey for the 14 patients whom we were able to contact. Ten of nineteen procedures (53%) produced enduring benefit of comfort, motion, and

function for up to 55 months. One patient was lost to follow-up and one patient died prior to the telephone survey. The deceased patient suffered from gallbladder cancer and died in Mexico after a cancer-related operation 7 months after the hydroplasty procedure. Results are summarized in the Table.

DISCUSSION

In our case series of hydroplasty for an unrestricted population of patients with capsular syndrome in the primary care office, 52% percent of patients experienced immediate pain relief and functional improvement. Benefits were sustained in 53% of patients for up to 55 months. Individuals who experienced improvement considered the benefits dramatic.

Study limitations include few patients, failure to record patients who refused the procedure, potential selection bias, and pathophysiologic diagnostic uncertainty. Although a few patients declined the procedure by authors' recollection, these were not tallied. Patients were encountered by presenting to an author or by word-of-mouth publicity. Patients who were pleased by the results of their procedure referred other patients. This may not be typical of a primary care practice.

Because this was not a randomized controlled trial, we cannot be certain that the benefit was a result of injected medications or saline distension. We attempted to exclude the anesthetic effect by reassessing pain and function approximately 1 week after the procedure. Corticosteroid injection was unlikely to explain the immediate benefits observed.

The question of diagnostic uncertainty is important. Adhesive capsulitis could logically respond to capsular distension. A clinical examination may be insufficient to differentiate this process from other inflammatory processes that cause pain and tethering loss of motion. Hydroplasty would likely fail if a capsular contraction process were not in progress.

Reports of some other published trials suggest results superior to our series.[9,10,11] There are several possible explanations. Visualization during arthrography might improve diagnostic certainty and consequently improve patient selection. More restrictive clinical patient selection parameters might improve the likelihood of treating patients who actually have adhesive capsulitis. Success might also depend on technical details, such as the volume and pressure applied during the distention injections. Randomized controlled trials comparing this treatment to other treatments were methodologically flawed.[13,14] A systematic review concludes there is little evidence to support or refute efficacy of common interventions.[6]

CONCLUSIONS

Shoulder hydroplasty is an office procedure that may provide immediate and dramatic benefit to patients suffering from adhesive capsulitis. There is a need for a comprehensive study of this syndrome and its treatment by primary care clinicians. Explicit definitions and prospective evaluation of treatments might clarify options for the patient and the front-line clinician. Use of expanded symptom scoring systems such as the Simple Shoulder Test and the Medical Outcomes Study Short-Form Health Survey could provide valid, reliable outcome measures.[2] While hydroplasty is an option for treatment of stiff and painful shoulders, it should ideally be compared with other treatment modalities in a randomized controlled trial.

· ACKNOWLEDGMENTS ·

The authors are grateful to Martee Robinson, Sheri Price, Vickie Greenwood, and the Cox Family Practice Residency writing group for immeasurable support and assistance.

REFERENCES

1. Siegel LB, Cohen NJ, Gall EP. Adhesive capsulitis: a sticky issue. Am Fam Physician 1999; 59:1843-50.
2. O'Kane JW, Jackson S, Sidles JA, Smith KL, Matsen, FA. Simple home program for frozen shoulder to improve patient's assessment of shoulder function and health status. J Am Board Fam Pract 1999; 12:270-77.
3. Reeves B. The natural history of the frozen shoulder syndrome. Scand J Rheumatology 1975; 4:193-96.
4. van der Windt DAWM, Koes BW, Deville W, Boeke AJP, de Jong BA, Bouter LM. Effectiveness of corticosteroid injections versus physiotherapy for treatment of painful stiff shoulder in primary care: randomized trial. BMJ 1998; 317:1292-96.
5. Dodenhoff RM, Levy O, Wilson A, Copeland SA. Manipulation under anesthesia for primary frozen shoulder: effect on early recovery and return to activity. J Shoulder Elbow Surg 2000; 9:23-26.
6. Green S, Buchbinder R, Glazier R, Forbes A. Systematic review of randomized controlled trials of interventions for painful shoulder: selection criteria, outcome assessment, and efficacy. BMJ 1998; 315:354-60.
7. Warner JJ, Allen A, Marks PH, Wong P. Arthroscopic release for chronic, refractory adhesive capsulitis of the shoulder. J Bone Joint Surg [Am] 1996; 78:1808-16.
8. Harryman DT, Matsen FA, Sidles JA. Arthroscopic management of refractory shoulder stiffness: arthroscopy: J Arthroscopic Related Surg 1997; 13:133-47.
9. Fareed DO, Gallivan WR. Office management of frozen shoulder syndrome: treatment with hydraulic distension under local anesthesia. Clin Orthopaed Related Res 1989; 242: 177-83.
10. Andren L and Lundberg BJ. Treatment of Rigid shoulders by Joint Distension During Arthrography. Acta Orthop Scand 1965; 36:45-53.
11. Van Royen BJ, Pavlov PW. Treatment of frozen shoulder by distension and manipulation under local anaesthesia. Int Orthopaed (SCIOT) 1996; 20:207-10.
12 van der Windt DAWM, Koes BW, de Jong BA, Bouter LM. Shoulder disorders in general practice: incidence, patient characteristics and management. Ann Rheum Dis 1995; 54:959-64.
13. Corbeil, V, Dussault RG, Leduc BE, Fleury J. Capsulite retractile de l'epaule: etude comparative de l'arthrographie avec corticotherapie intra-articulaire avec ou sans distension capsulaire. J Can Assoc Radiol 1992; 43:127-30.
14. Jacobs LGH, Barton MAJ, Wallace WA, Ferrousis J, Dunn NA, Bossingham DH. Intra-articular distension and steroids in the management of capsulitis of the shoulder. BMJ 1991; 302:1498-501.

JFP