



Management of Adhesive Capsulitis of the Shoulder: Recommendation for Home Exercises Program during COVID-19 Pandemic

Amine Kalai¹, Mohamed Guedria², Amr Chaabeni¹, Zohra Ben Salah Frih¹, Anis Jellad^{1*}

¹Department of Physical Medicine and Rehabilitation, Faculty of Medicine, University of Monastir, Monastir, Tunisia

²Sports Medicine Center, Department of Physical Medicine and Rehabilitation, Orthopaedic Hospital, Lausanne University Hospital, Lausanne, Switzerland

Email: *anisjellad@gmail.com

How to cite this paper: Kalai, A., Guedria, M., Chaabeni, A., Frih, Z.B.S. and Jellad, A. (2022) Management of Adhesive Capsulitis of the Shoulder: Recommendation for Home Exercises Program during COVID-19 Pandemic. *Open Access Library Journal*, 9: e9443. <https://doi.org/10.4236/oalib.1109443>

Received: October 12, 2022

Accepted: November 14, 2022

Published: November 17, 2022

Copyright © 2022 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Adhesive capsulitis (AC) of the shoulder is a painful condition in which active and passive range of motion (ROM) of the shoulder becomes restricted. Severe pain and ROM restriction may last approximately 1 to 3 years with incomplete resolution leading to an impairment of daily living and professional activities and quality of life with a consequent social and economic burden. Since health care services have been shifted to the fight against the deadly coronavirus disease 2019 (COVID-19), a minimum of necessary care should be allocated to manage painful and impairing musculoskeletal conditions such as AC of the shoulder. Home exercises (HEs) are accepted as a key element in the conservative treatment of AC of the shoulder. The aim of this point of view is to propose a concise and clinically relevant HE recommendation for patients with AC of the shoulder during the time of covid-19 restrictions. During the pain predominant stage of AC, pendulum exercises and passive and active-assisted ROM mobilizations are mainly proposed. Heat application and shoulder muscle strengthening should be added during the stiffness predominant stage. Optimally, three daily sessions with 30 min duration each are proposed for three to six months. HEs remain a practical solution to help AC patients relieve pain and gain shoulder ROM during pandemics restrictions.

Subject Areas

Rheumatology

Keywords

COVID-19, Pandemic, Shoulder Pain, Bursitis, Rehabilitation

1. Introduction

Adhesive capsulitis (AC) of the shoulder is a painful condition in which active and passive range of motion (ROM) of the shoulder becomes restricted. Its incidence is estimated between 2% and 5% of the general population [1]. AC can be either primary, if the etiology is unknown, or secondary, when it can be attributed to another cause such as diabetes [2]. Its prevalence can reach as high as 13.4% in diabetic patients [3]. Pain and ROM restriction are commonly severe, lasting for approximately 1 to 3 years and their resolution may be incomplete [2]. Thus, functional capacities, including daily living and professional activities, and quality of life are commonly impaired leading to a consequent social and economic burden [4].

Conventional management of AC comprises conservative approaches, especially supervised and non-supervised rehabilitation, injections and rarely surgery when conservative management fails [2].

The coronavirus disease 2019 (COVID-19) pandemic constitutes a barrier to the implementation of AC therapeutic interventions since governments worldwide adopted severe restrictions, such as social distancing and mandatory quarantines, in an attempt to control the spread of the virus [5]. In addition, resources have been shifted toward acute and life-threatening conditions and management of patients afflicted with COVID-19 in order to alleviate the burden on health care systems. Since COVID-19 continues to spread and causes an increase in deaths [6] it still draws attention at the expense of other health problems especially musculoskeletal painful conditions such as AC of the shoulder [7]. Therefore, to provide different services at a distance, solutions such as e-rehabilitation [8] and e-learning [9] are proposed.

Unsupervised rehabilitation specifically home exercises (HE) may be proposed as an adequate alternative to manage AC of the shoulder. Indeed, HE and patient education are accepted as key elements of care, but programs remain heterogeneous with no specific recommendations about type of exercises and dose. Thus structured protocol of HE still needed [10] [11].

We decided to elaborate on a simple HE recommendation for patients with AC of the shoulder. Our intention is to prevent the lengthening of symptoms course especially pain and ROM limitation under the covid-19 restrictions. The aim of this point of view is to propose a concise and clinically relevant HE recommendation for patients with AC of the shoulder during the time of covid-19 restrictions.

2. HE Programs According to AC Stages

Since AC of shoulder progresses through three overlapping stages: stage 1 or stage of pain (lasting 2 - 9 months), stage 2 or stage of stiffness (lasting 4 - 12 months) and stage 3 or stage of recovery (lasting 5 - 24 months) [12] [13]. We provided recommendation for two stages according to the predominance of pain or stiffness: pain predominant stage and stiffness predominant stage. Exercises

dose and combination were tailored accordingly. Essentially the HE programs include stretching (ROM and pendulum exercises) and strengthening exercises.

2.1. Pain Predominant Stage

Cautionary aggressive mobilization should be avoided during the pain predominant stage [11]. We recommend at this stage pendulum (Codman) and passive and active-assisted ROM exercises. They are useful as gentle stretching exercises of short duration [13]. Superficial heating can be used in this stage by employing hot packs [14] [15].

- Pendulum exercises

Pendulum exercises have been used in many rehabilitation protocols for the management of painful shoulder. They constitute a safe option to upgrade the early general upper limb stretching [16]. They can be weighted or unweighted and multiplanar allowing the patient to swing his arm in the sagittal (forward and backward) and the frontal plan (side to side) and in a circular motion (circumduction). The use of pendulum exercises may facilitate the entrance of nutritional substances into the joint space and the removal of waste, thus, by this way the suppression of inflammation may explain the improvement of pain and function in patients with shoulder conditions such as subacromial impingement [17]. We suggest a 10 minutes pendulum exercise in all directions of shoulder motion in each HE session.

- Passive ROM exercises

Shoulder passive ROM exercises comprise stretching in forward elevation, abduction, horizontal adduction and external and internal rotations. Undertaking these exercises remains easy with the use of simple and cheap equipment. Use the unaffected arm to lift up the affected arm for forward elevation and to abduction, bringing the arm up and across the body for horizontal adduction, using a small bamboo or a stick to push against the palm of the affected side for the external rotation and bringing the arm behind the back using a towel for the internal rotation are simple, practical and effective exercises [17] [18] [19]. We suggest 10 repetitions of 15 seconds hold for each exercise in each HE session (15 min approximately).

- Active-assisted ROM

Previous described ROM exercises may be performed actively with the help of the unaffected arm. Active-assisted ROM exercises imply active participation of the affected arm allowing sustainability of muscle function and prevention of muscle weakness and amyotrophy. The shoulder still involved in multiplanar range motion exercises (forward elevation, abduction, horizontal adduction and external and internal rotations). Active-assisted ROM exercises may be proposed with the same dosage as passive ROM with 10 repetitions of 15 seconds hold for each exercise (15 min approximately).

Health providers should advice patients to exercise within the painless range with the resumption of all tolerable activities. Engaged patients may be allowed

to reach the point of tolerable discomfort during exercises.

To summarize we suggest, during the pain predominant stage, three months HE program as it has been adopted by several authors with three daily sessions, thirty minutes each [20] [21]. Patients should start with pendulum and passive ROM exercises during the first sessions, whereas active-assisted ROM may be introduced progressively according to their pain tolerance.

2.2. Stiffness Predominant Stage

- Heating

Patients may be advised to start HE session with heating the shoulder area using a simple hot pack. The benefit of heating on soft tissues has been reported; indeed it could alter their viscoelastic properties and drop their tensile stress [22] [23] [24]. In case of AC of the shoulder heating may improve pain relief and shoulder ROM and function [25] [26] [27]. Its use is common especially during the stiffness predominant stage with twenty minutes application [26] [28] [29].

- Pendulum exercises

Pendulum exercises may follow heat application to promote shoulder stretching and remain performed according to the same options previously cited.

- Add active ROM exercises

Passive and active-assisted ROM exercises described during the pain predominant stage should be continued with a special intention to the stretching of chest muscles and muscles of the back of the shoulder [30].

Active ROM exercises (wall climbing and wall slides) may be added and still cover all shoulder planes of motion [29] [31]. A special interest should be given to regain flexion, abduction and ER which allow the patient to move his upper limb through a wide range of space. We suggest 10 repetitions of 15 seconds hold for each exercise in each HE session (15 min approximately).

- Strengthening exercises

Strengthening exercises (isometric shoulder external rotation) and posterior capsular stretching may be introduced [30]. Intensive joint mobilizations techniques aim to restore ROM through distension and elongation of periarticular structures, increasing the tension of some capsular and ligamentous components [32].

We suggest 10 repetitions of 10 seconds hold for each exercise in each HE session.

To summarize we suggest during the stiffness predominant stage a three to six months HE program as it has been adopted by several authors [18] [31] [33].

Figures 1-9 illustrate the actions of these home exercises.

3. Conclusion

The main purpose of managing the AC of the shoulder is to reduce pain, improve ROM limitation and shorten discomfort period. During pandemics such as the current covid-19 pandemic, HEs constitute a practical solution to overcome the barriers in front of patients with disabling painful conditions such as

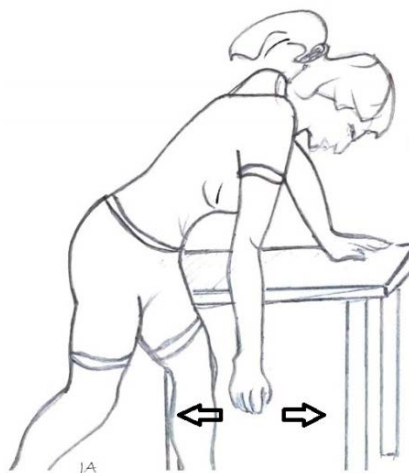


Figure 1. Pendulum exercises may be performed in forward position, the patient use table for support and let his upper extremity swing in the sagittal or the frontal plan or in a circular motion.

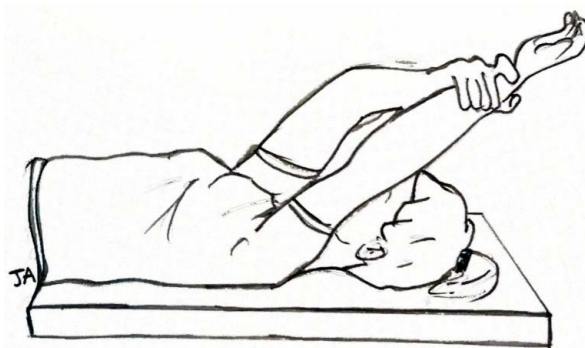


Figure 2. Passive anterior elevation: the patient lies in supine position and brings the arm of the painful side with his contralateral hand and performs a passive gentle anterior elevation.

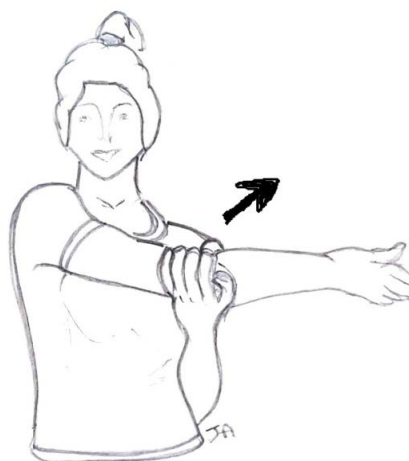


Figure 3. Horizontal adduction of the arm: the patient brings the painful arm up and across the body gently.

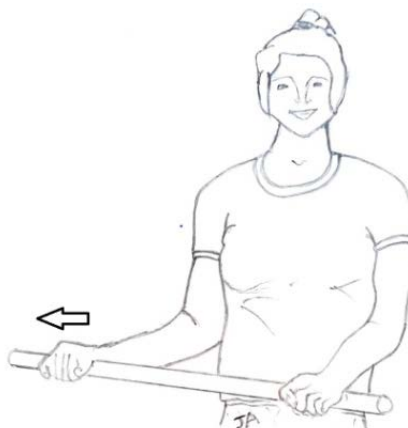


Figure 4. Passive external rotation: the patient uses a stick to push against the painful arm over to the side.

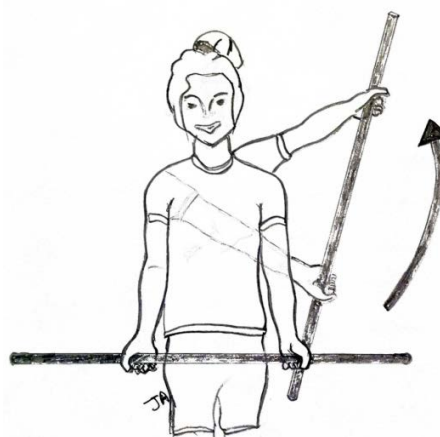


Figure 5. Passive shoulder abduction: the patient uses a stick to push against the painful arm to the side elevation.

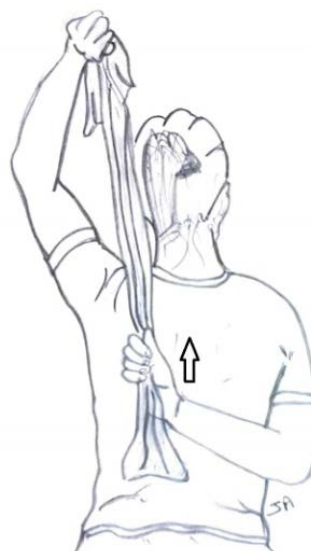


Figure 6. Passive internal rotation: the patient uses a towel behind his back to pull the painful arm upward.

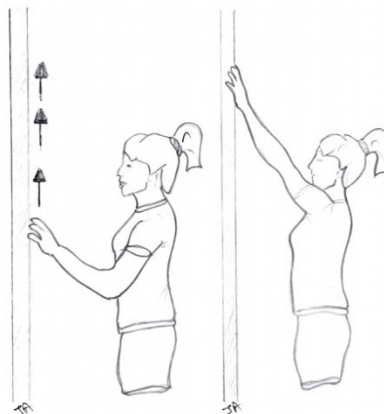


Figure 7. Active anterior elevation: the patient uses the wall walks technique (he slowly walks his fingers up the wall) to raise his painful arm forward.

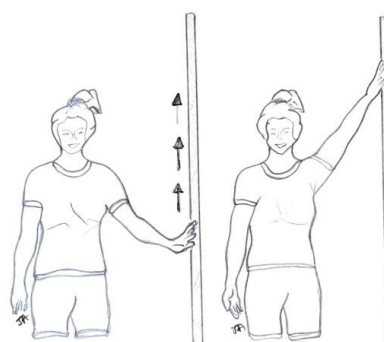


Figure 8. Active lateral elevation: the patient uses the wall walks technique (he slowly walks his fingers up the wall) to raise his painful arm laterally.



Figure 9. Shoulder external rotation strengthening exercise: the patient perform an external rotation against the resistance of a rubber attached to the doorknob. The patient rotates his arm outward few centimeters and hold for ten seconds.

AC of the shoulder. Programs should be simple and concise in order to guarantee patients' compliance.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Kingston, K., Curry, E.J., Galvin, J.W. and Li, X. (2018) Shoulder Adhesive Capsulitis: Epidemiology and Predictors of Surgery. *Journal of Shoulder and Elbow Surgery*, **27**, 1437-1443. <https://doi.org/10.1016/j.jse.2018.04.004>
- [2] Le, H.V., Lee, S.J., Nazarian, A. and Rodriguez, E.K. (2017) Adhesive Capsulitis of the Shoulder: Review of Pathophysiology and Current Clinical Treatments. *Shoulder & Elbow*, **9**, 75-84. <https://doi.org/10.1177/17585732166676786>
- [3] Zreik, N.H., Malik, R.A. and Charalambous, C.P. (2016) Adhesive Capsulitis of the Shoulder and Diabetes: A Meta-Analysis of Prevalence. *Muscle, Ligaments and Tendons Journal*, **6**, 26-34.
- [4] van den Hout, W.B., Vermeulen, H.M., Rozing, P.M. and Vliet Vlieland, T.P.M. (2005) Impact of Adhesive Capsulitis and Economic Evaluation of High-Grade and Low-Grade Mobilisation Techniques. *Australian Journal of Physiotherapy*, **51**, 141-149. [https://doi.org/10.1016/S0004-9514\(05\)70020-9](https://doi.org/10.1016/S0004-9514(05)70020-9)
- [5] McCloskey, B., Zumla, A., Ippolito, G., Blumberg, L., Arbon, P., Cicero, A., et al. (2020) Mass Gathering Events and Reducing Further Global Spread of COVID-19: A Political and Public Health Dilemma. *The Lancet*, **395**, 1096-1099. [https://doi.org/10.1016/S0140-6736\(20\)30681-4](https://doi.org/10.1016/S0140-6736(20)30681-4)
- [6] Salabei, J.K., Asnake, Z.T., Ismail, Z.H., Charles, K., Stanger, G.-T., Abdullahi, A.H., et al. (2022) COVID-19 and the Cardiovascular System: An Update. *The American Journal of the Medical Sciences*, **364**, 139-147. <https://doi.org/10.1016/j.amjms.2022.01.022>
- [7] Turolla, A., Rossetini, G., Viceconti, A., Palese, A. and Geri, T. (2020) Musculoskeletal Physical Therapy during the COVID-19 Pandemic: Is Telerehabilitation the Answer? *Physical Therapy*, **100**, 1260-1264. <https://doi.org/10.1093/ptj/pzaa093>
- [8] Srivastav, A.K. and Samuel, A.J. (2020) E-Rehabilitation: One Solution for Patients with Parkinson's Disease in COVID-19 Era. *Parkinsonism & Related Disorders*, **75**, 128-129. <https://doi.org/10.1016/j.parkreldis.2020.05.021>
- [9] Cabual, R.A. and Cabual, M.M.A. (2022) The Extent of the Challenges in Online Learning during the COVID-19 Pandemic. *Open Access Library Journal*, **9**, 1-13. <https://doi.org/10.4236/oalib.1108233>
- [10] Hanchard, N.C.A., Goodchild, L., Brealey, S.D., Lamb, S.E. and Rangan, A. (2020) Physiotherapy for Primary Frozen Shoulder in Secondary Care: Developing and Implementing Stand-Alone and Post Operative Protocols for UK FROST and Inferences for Wider Practice. *Physiotherapy*, **107**, 150-160. <https://doi.org/10.1016/j.physio.2019.07.004>
- [11] Maund, E., Craig, D., Suekarran, S., Neilson, A., Wright, K., Brealey, S., et al. (2012) Management of Frozen Shoulder: A Systematic Review and Cost-Effectiveness Analysis. *Health Technology Assessment*, **16**, 1-264. <https://doi.org/10.3310/hta16110>
- [12] Reeves, B. (1975) The Natural History of the Frozen Shoulder Syndrome. *Scandinavian Journal of Rheumatology*, **4**, 193-196. <https://doi.org/10.3109/03009747509165255>

- [13] Challoumas, D., Biddle, M., McLean, M. and Millar, N.L. (2020) Comparison of Treatments for Frozen Shoulder: A Systematic Review and Meta-Analysis. *JAMA Network Open*, **3**, e2029581. <https://doi.org/10.1001/jamanetworkopen.2020.29581>
- [14] Guler-Uysal, F. and Kozanoglu, E. (2004) Comparison of the Early Response to Two Methods of Rehabilitation in Adhesive Capsulitis. *Swiss Medical Weekly*, **134**, 353-358.
- [15] SaraçgilCoşar, S.N., Ozen, S., NiyaziKurtcebe, A., Coşkun, M. and ÜmitYemişçi, O. (2021) Prognostic Value of Magnetic Resonance Imaging in the Evaluation of Physical Therapy Outcomes in Patients with Adhesive Capsulitis. *Turkish Journal of Physical Medicine and Rehabilitation*, **67**, 146-154. <https://doi.org/10.5606/tftrd.2021.5139>
- [16] Cunningham, G., Charbonnier, C., Lädermann, A., Chagué, S. and Sonnabend, D.H. (2020) Shoulder Motion Analysis during Codman Pendulum Exercises. *Arthroscopy, Sports Medicine, and Rehabilitation*, **2**, e333-e339. <https://doi.org/10.1016/j.asmr.2020.04.013>
- [17] Akkaya, N., Akkaya, S., Gungor, H.R., Yaşar, G., Atalay, N.S. and Sahin, F. (2017) Effects of Weighted and Un-Weighted Pendulum Exercises on Ultrasonographic Acromiohumeral Distance in Patients with Subacromial Impingement Syndrome. *Journal of Back and Musculoskeletal Rehabilitation*, **30**, 221-228. <https://doi.org/10.3233/BMR-160737>
- [18] Cheing, G.L.Y., So, E.M.L. and Chao, C.Y.L. (2008) Effectiveness of Electroacupuncture and Interferential Electrotherapy in the Management of Frozen Shoulder. *Journal of Rehabilitation Medicine*, **40**, 166-170. <https://doi.org/10.2340/16501977-0142>
- [19] Chen, Y.-P., Lin, C.-Y., Tsai, M.-J., Chuang, T.-Y. and Lee, O.K.-S. (2020) Wearable Motion Sensor Device to Facilitate Rehabilitation in Patients with Shoulder Adhesive Capsulitis: Pilot Study to Assess Feasibility. *Journal of Medical Internet Research*, **22**, e17032. <https://doi.org/10.2196/17032>
- [20] Dundar, U., Toktas, H., Cakir, T., Evcik, D. and Kavuncu, V. (2009) Continuous Passive Motion Provides Good Pain Control in Patients with Adhesive Capsulitis. *International Journal of Rehabilitation Research*, **32**, 193-198. <https://doi.org/10.1097/MRR.0b013e3283103aac>
- [21] Bal, A., Eksioğlu, E., Gulec, B., Aydog, E., Gurcay, E. and Cakci, A. (2008) Effectiveness of Corticosteroid Injection in Adhesive Capsulitis. *Clinical Rehabilitation*, **22**, 503-512. <https://doi.org/10.1177/0269215508086179>
- [22] Park, K.-H., Kim, J.-Y. and Park, R.-J. (2002) Biophysical Principles of Superficial Heating and Deep Heating Agents. *The Journal of Korean Physical Therapy*, **14**, 197-203.
- [23] Hardy, M. and Woodall, W. (1998) Therapeutic Effects of Heat, Cold, and Stretch on Connective Tissue. *Journal of Hand Therapy*, **11**, 148-156. [https://doi.org/10.1016/S0894-1130\(98\)80013-6](https://doi.org/10.1016/S0894-1130(98)80013-6)
- [24] Lehmann, J.F., Masock, A.J., Warren, C.G. and Koblanski, J.N. (1970) Effect of Therapeutic Temperatures on Tendon Extensibility. *Archives of Physical Medicine and Rehabilitation*, **51**, 481-487.
- [25] Leung, M.S.F. and Cheing, G.L.Y. (2008) Effects of Deep and Superficial Heating in the Management of Frozen Shoulder. *Journal of Rehabilitation Medicine*, **40**, 145-150. <https://doi.org/10.2340/16501977-0146>
- [26] Tatar, K.K. and Turhan, B. (2022) The Effects of Complex Decongestive Therapy on Pain and Functionality in Individuals with Breast Cancer Who Developed Adhesive

- Capsulitis Due to Lymphedema: An Evaluation by an Isokinetic Computerized System. *The Korean Journal of Pain*, **35**, 280-290. <https://doi.org/10.3344/kjp.2022.35.3.280>
- [27] Hammad, S.M., Arsh, A., Iqbal, M., Khan, W. and Bilal, S.A. (2019) Comparing the Effectiveness of Kaltenborn Mobilization with Thermotherapy versus Kaltenborn Mobilization Alone in Patients with Frozen Shoulder [Adhesive Capsulitis]: A Randomized Control Trial. *Journal of Pakistan Medical Association*, **69**, 1421-1424. <https://doi.org/10.5455/JPMA.279>
- [28] Pajareya, K., Chadchavalpanichaya, N., Painmanakit, S., Kaidwan, C., Puttaruksa, P. and Wongsaranuchit, Y. (2004) Effectiveness of Physical Therapy for Patients with Adhesive Capsulitis: A Randomized Controlled Trial. *Journal of the Medical Association of Thailand*, **87**, 473-480.
- [29] Dogru, H., Basaran, S. and Sarpel, T. (2008) Effectiveness of Therapeutic Ultrasound in Adhesive Capsulitis. *Joint Bone Spine*, **75**, 445-450. <https://doi.org/10.1016/j.jbspin.2007.07.016>
- [30] Chan, H.B.Y., Pua, P.Y. and How, C.H. (2017) Physical Therapy in the Management of Frozen Shoulder. *Singapore Medical Journal*, **58**, 685-689. <https://doi.org/10.11622/smedj.2017107>
- [31] Robinson, P.M., Norris, J. and Roberts, C.P. (2017) Randomized Controlled Trial of Supervised Physiotherapy versus a Home Exercise Program after Hydrodilatation for the Management of Primary Frozen Shoulder. *Journal of Shoulder and Elbow Surgery*, **26**, 757-765. <https://doi.org/10.1016/j.jse.2017.01.012>
- [32] Hsu, A.-T., Chiu, J.-F. and Chang, J.H. (2009) Biomechanical Analysis of Axial Distraction Mobilization of the Glenohumeral Joint—A Cadaver Study. *Manual Therapy*, **14**, 381-386. <https://doi.org/10.1016/j.math.2008.06.003>
- [33] Carette, S., Moffet, H., Tardif, J., Bessette, L., Morin, F., Frémont, P., et al. (2003) Intraarticular Corticosteroids, Supervised Physiotherapy, or a Combination of the Two in the Treatment of Adhesive Capsulitis of the Shoulder: A Placebo-Controlled Trial. *Arthritis & Rheumatology*, **48**, 829-838. <https://doi.org/10.1002/art.10954>