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Effectiveness of Cryoultrasound therapy in the treatment of tendon pathologies

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Introduction

The pathologies from overuse, including tendon injuries constitute approximately 7% of all medical visits in the United States¹. Tendonitis is a frequent cause of pain and functional deficit with a maximum incidence in adults between 30 and 50 years of age. The high incidence of chronicity and recurrence of such pathology^{2,3}, results in an appreciable morbidity and loss of productivity, as well as reflecting in a consistent socio-economic burden⁴. In fact, thousand of workers every year suffer from tendon pathologies from overuse with consequent loss of working hours⁵, even though, in about 80% of cases, the pathology is completely cured within three to six months of its onset.

There are many treatments used in cases of tendon injuries, amongst which we find ultrasound therapy and cryotherapy, although there is little data in support of this⁶. In consideration of the above, our work proposes to evaluate the therapeutic effectiveness of Cryoultrasound treatment, which associates the ultrasound with cryotherapy, in the treatment of tendon pathologies.

Materials and methods

18 patients were treated (8 females and 10 males) suffering from symptomatic tendonopathies. The average age was 39,78±15,57 anni (range 17-74). The clinical evaluation was integrated with a pre and post treatment ultrasound examination. The criteria for exclusion included the following pre-existing conditions: osteoporosis with elevated turnover, presence of metallic fragments, haemorrhage, varicose veins, thrombophlebitis, pace-maker, obliterating arthropathies, neoplasias, tuberculosis, pregnancy, growing epiphysis, Raynaud's disease, having undergone previous physiotherapy treatment within six months from the beginning of treatment with Cryoultrasound, and, in order to avoid confusing factors in reading the ultrasound imaging, the presence of concomitant pathologies which could influence the reliability of the instrumental readings during treatment.

Every patient underwent a cycle of 10 sessions (20 minutes, continuous mode, 1.8 watt/cm, temperature -2°C) at daily intervals.

The results were evaluated in pain reduction and articulation function recovery of the interested part. The parameters relating to pain were obtained by using the Visual Analogic Scale (VAS). The pain detected during the patient's examination was classified as follows: pain on digital pressure or palpation on the interested part, pain when moving against pressure and no pain. A score of 5 was given to the first to cases and zero to the third case. The overall score was obtained by never summing to 5 scores.

The activity was evaluated by attributing a 0 score in case of complete activity, 5 in the case of light activity possible, 10 in the presence of a complete inability to use the limb. In the evaluation of the Range of Motion (R.O.M.) the following score was attributed: complete=0, complete with pain =5, incomplete=10.



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The descriptive statistics was used to describe the characteristics of the population. The comparison of the readings in the VAS scale was done with the use of the t-test for matching data. Readings of $p < 0,05$ were considered to be significant.

The data was analysed with SPSS software.

Table I. – Pain is manifested and/or increases

	T1	T2	T3
1. at rest	44,4%	22,2%	11,1%
2. during activity	16,7%	33,3%	16,7%
3. during and after activity	38,9%	11,1%	11,1%
4. only after activity	0,00	16,7%	33,3%
5. absence of pain	0,00	16,7%	27,8%

Results

A swelling on the injured part was present in 22,2% of cases.

Table I and in Figures 1-3 show a summary of the data concerning the time of onset and/or increase of pain, the variation in the pain on medical examination, the changes in activity and in the Range of Motion between the baseline (T1), the fifth (T2) and the tenth session (T3).

Table II shows the minimum, maximum and average readings and the standard deviation of the scores of the VAS scale in the pre-treatment phase, at the fifth and at the tenth session.

Figure 1. – Pain on palpation.

Figure 2. – Activity.

Figure 3. – Range of articulation.

Table II. – VAS – Variations of the average score.

VAS	Min	Max	Medium	DS
T1	2,00	10,00	5,72	1,96
T2	0,00	7,00	4,39	1,61
T3	0,00	6,00	3,39	1,72

The average score variation in the VAS scale between the pre-treatment and post-treatment, evaluated with the t-test for matching data turned out to be statistically significant ($p=0,021$).

Discussion

It is difficult to prescribe an appropriate treatment for tendinopathies, especially if one considers the fact that the therapies used are frequently based on empirical evidence and, often, vary from doctor to doctor.

In spite of scientific evidence being limited, in some controversial cases, doctors frequently resort to ultrasound therapy even though this therapy has proved effective only in the cases of calcified tendonopathy and in epycondilitis.



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Further confirmation can be obtained with regard to cryotherapy. In Achilles tendonitis, intermittent cryotherapy applications caused a reduction of blood flow in the capillaries of 71%, with subsequent restoration of a normal saturation of oxygen within two minutes of its interruption⁹. The authors of a recent review⁹ on the use of cryotherapy in soft tissue pathologies come to the conclusion that the application of ice wrapped in a damp cloth for a period of 10 minutes is effective in pain reduction on the short term as well as in controlling the edema.

More specifically, Costantino *et al.*¹¹, have demonstrated how Cryoultrasound is a useful instrument in the treatment of tendon pathologies. It has shown advantages with respect to the CO₂ laser and a higher efficacy index and long term maintenance of the results obtained compared to tecar therapy.

Ultrasound imaging as an investigation option in support of the medical examination, as expected, showed the characteristic changes in the tendon, though without indicating a close correlation between the tendon's morphology and the symptoms.

The parameters relating to pain were obtained by using the Visual Analogic Scale (VAS).

Summary

Tendon pathologies are a frequent cause of pain and functional deficit with the highest incidence in adults between 30 and 50 years of age. The purpose of our work was to evaluate the therapeutic effectiveness of Cryoultrasound in the treatment of tendonopathies

18 patients were treated (8 females and 10 males) suffering from symptomatic tendonopathies. The clinical evaluation was integrated with pre and post treatment ultrasound imaging. Every patient underwent a cycle of 10 sessions (20 minutes, continuous mode, 1.8 watt/cm, temperature -2°C) at daily intervals. The results were evaluated in pain reduction and articulation function recovery of the interested part. The parameters relating to pain were obtained by using the Visual Analogic Scale (VAS). The average variation of the VAS scale scores between pre and post treatment with the t-test for matching data turned out to be significant ($p=0,021$).

Cryoultrasound treatment in cases of tendonopathy gave good results with a better response to pain reduction with respect to the articulation function.

Key words: Cryoultrasound therapy, tendonopathy

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