

RESEARCH COLLECTION ON PAIN



Research Collection on Pain

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Radiofrequency Treatments for Neuropathic Pain: Review and New Approaches 125

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Preface

The causes, assessment and management of pain together form a tremendously wide-ranging subject that enters into every area of clinical practice and healthcare. This book brings together current research on both nociceptive and neuropathic pain, bringing into focus this difficult but nonetheless pressing topic. The first part of the book offers perspectives of pain, asking what pain is and how it has been conceptualized both within and beyond medicine; one chapter, for example, examines the physical and psychological aspects of pain in pregnancy and childbirth, considering historical and cultural perspectives, as well as surveying common medical and non-medical approaches to pain relief. The second part focuses on neuropathic pain, the type of pain originating in the nervous system. This part includes an overview of the diagnoses and assessment of this type of pain, a review of intravenous therapies such as the use of ketamine and lidocaine for chronic neuropathic pain, and a review of current approaches to radiofrequency treatments. The book will be of interest to a wide variety of readers in research, clinical and healthcare contexts with specialist interests in pain management.



PAIN IN PERSPECTIVE

Edited by Subhamay Ghosh

Shoulder Pain in Swimmers

Julio José Contreras Fernández, Rodrigo Liendo Verdugo, Matías Osorio Feito and Francisco Soza Rex

Additional information is available at the end of the chapter

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1. Introduction

Shoulder pain is the most important symptom that affects competitive swimmers, with a prevalence between 40 - 91% [1-3], and it constitutes a special syndrome called the "swimmer's shoulder".

This syndrome, described by Kennedy and Hawkins in 1974 [3] consists in discomfort after swimming activities in a first step. This may progress to pain during and after training. Finally, the pain affects the progress of the athlete [4]. Some researchers have demonstrated that an important proportion of competitive swimmers have shoulder pain that interferes with training and progress of their abilities. The percentage of athletes with swimmer's shoulder is proportional to the age, the years of practice and the level of competition. Swimmers with interfering pain might not progress in training and thus will not compete as effectively [5].

One of the first reports of this problem was in the 1972 Olympic Games in Munich; Kennedy noticed a high incidence of shoulder pain among swimmers of Canadian group: of 35 competitive swimmers, there were 43 orthopaedic consultations, with 16 specific-related to shoulder (37%), being the most frequent problem [4].

Kennedy had performed a cross-Canada survey involving all competitive swimmers (5000 yards per day). A total of 2496 swimmers were included, reporting a 3% (81 swimmers) shoulder complaints, caused primarily by the freestyle and butterfly strokes and occasionally by the backstroke [4].

2. Epidemiology of shoulder pain in competitive swimmers

The epidemiology of shoulder pain in competitive swimmers has been studied by many researchers. The estimation of prevalence of shoulder pain is very difficult because it is



related with the subjective experience of pain, memory factors, level of training and the definition of pain considered by the researchers. It is important to establish the difference about the type of evolution of pain (acute, sub-acute, chronic or history of pain) and to differentiate pain of exercise-induced soreness.

As mentioned above, Kennedy et al [4] found a prevalence of 3% of anterior shoulder pain in competitive swimmers. In later surveys, the prevalence has been reported as much higher from 15% to 80% [1].

McMaster and Troup [5] in 1993 performed one of the largest descriptive studies on shoulder pain in competitive swimmers, consisting in a survey questionnaire self administered under classroom-style supervision to a group of 1262 USA swimmers. They included group demographics, training profiles and out-of-water training techniques. They clearly defined the pain as that which interfered with training or progress in training as opposed to post-exercise muscle soreness. Specifically, they questioned about the current experience of pain and the history of pain at any time during the swimming career. With these definitions, the prevalence of history of pain was 71% for male swimmers and 75% for female swimmers. The prevalence of actual pain is less than history of pain (17% in males and 35% in women) [Table 1].

Richardson et al [6] in 1978 performed a survey and physical examination to 137 competitive swimmers. They found a prevalence of history of pain of 52% in "elite" swimmers and 57% in "championship" group (World Champion Team group). In the overall group, a greater percentage of men, as compared to women, complained about shoulder problems (46 vs. 40%). When individual groups were considered, the "elite" women had the greater number of complaints [Table 1].

Bak et al [1] in 1994-1995 season performed detailed interviews and clinical examinations (probably, the most detailed descriptive study of shoulder pain in competitive swimmers) to 36 Danish swimmers. 33 swimmers had unilateral shoulder pain and 13 had bilateral pain. Thirteen swimmers were National Team members (half of the subjects with bilateral complaints were National Team swimmers).

Author - year	Participants (n)	Age	Gender (female - male)	Acute Pain	Sub acute pain (2- week)	History of pain
McMaster et al - 1993	1262	19,5	Not described	9,4 - 35%	Not described	38 – 75%
Richardson et al - 1980	137	14 – 23	83 - 54	Not described	Not described	52 - 57%
Bak et al - 1997	36	17 (12 - 23)	22 - 14	Not described	Not described	91,66%
Contreras et al - 2010	40	17,96 ± 4,11	16 - 24	20%	46,67%	80%

Table 1. Descriptive studies of shoulder pain prevalence in competitive swimmers.

Our research group performed a descriptive study in 2008-2009 [7] to a group of 40 competitive swimmers from the "Universidad de Chile". In our study, the prevalence of history of shoulder pain is 80%. A 20% presented actual pain and the 47% a two week pain. These results are comparable with the international surveys [Table 2].

Years of practice	Meters per day	Weight work hours per week	Stretching time (minutes)	Use of implements	Preferred stroke	Preferred contest
6,07 (3,69)	4716,67 (1297,77)	2,72 (0,96)	7,72 (6,67)	73,33%	Freestyle 73,33%	Sprint 56,67%

Table 2. Training data; the values are expressed in mean (SD) or as percentages.

The survey method for data collection has inherent limitations to correlate cause and effect relationships. But competitive swimmers are very sensitive to their shoulder problems and their ability to effectively train. They have the opportunities to compete against other swimmers and to perform timed trainings.

3. Shoulder Biomechanics in swimming

Swimming requires several different shoulder motions, most being performed during circumduction in clockwise and counter-clockwise directions with varying degrees of internal and external rotation and scapular protraction and retraction [8].

Competitive swimmers used four types of strokes: freestyle or front crawl stroke, breaststroke, backstroke, and butterfly stroke. The fastest, most popular and most widely used stroke for training is the freestyle stroke [9]. The power for this stroke comes 80% from the pull and 20% from the kick [9].

The freestyle stroke pull-cycle can be divided in four phases [10]:

- 1. Early pull-through: beginning with the hand entry into the water and ending when the humerus is perpendicular to the axis of the torso.
- 2. Late pull-through: beginning at the completion of early pull-through and ending as the hand leaves the water.
- 3. Early recovery: beginning at hand exit and ending when the humerus is perpendicular to the water surface.
- 4. Late recovery: beginning at the completion of early recovery and ending at hand entry.

During the entry and beginning of the pull phases, the glenohumeral joint is in forward flexion, and the humerus is in abduction and internal rotation [9]. During the end of the pull, the joint is extended and the humerus is in adduction and internal rotation [9]. During the recovery period, the arm is in abduction and internal rotation, moving from extension to flexion above the water [9].

The backstroke is considered the complement to the freestyle stroke, and the arm actions involve the same four phases; however, power comes 25% from the kick and 75% from the pull [9].