



# **HEAD AND NECK INJURIES IN SPORTS**

**EARL F. HOERNER**

**EDITOR**



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# ***Head and Neck Injuries in Sports***

*Earl F. Hoerner, Editor*

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The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of these peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution to time and effort on behalf of ASTM.

# Foreword

This publication, *Head and Neck Injuries in Sports*, contains papers presented at the symposium of the same name, held in Atlanta, GA on 19–20 May, 1993. The symposium was sponsored by ASTM Committee F-8 on Sports Equipment and Facilities. Earl F. Hoerner, Chairman of Committee F-8, presided as symposium chairman and is the editor of the resulting publication.

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# Overview

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Conferences and symposiums on head and neck injuries in sports are not a recent development. It is noted in the many references to the papers authored in this special technical publication (STP) that they are dated over a 50- to 60-year span. The pioneers that have been evaluating and assessing the risk factors and equipment and facility protection include scientists and investigators such as Burstein, Patrick, Hodgson, Fenner, McElhaney, Schneider, and others. Although independent papers and publications appear on a sporadic basis in the literature, it has been a number of years since a group of scientists of various disciplines got together to review and present their research, clinical experiences, data collection, and the application of their accumulated experiences and knowledge.

In 1969, the American Society for Testing and Materials (ASTM) initiated a group composed of scientists, manufacturers of equipment, academicians, and other interested parties to prepare and write a standard for a helmet to be used in American football for head protection. To establish this standard, an ASTM Subcommittee, F08.53 on Headgear, was formed under the existing Committee F-8 on Sports Equipment and Facilities. As interest and scope broadened in the early 1970s, other subcommittees, including F08.51 on Medical Aspects and Biomechanics, as well as F08.91 on Biostatistics and Epidemiology, were established.

During this same time frame, basic and clinical Sciences, using the development of technology, established reference databases, as well as data collection and information sources for the study of motion, the application of physics, and the laws of natural science with special emphasis on the effects and results of forces and energy (kinetic) on the human body. In addition, scientific groups and associations began to evolve within the applied specialties of biomechanics, bioengineering, mechanical and electrical engineering, including as well, the clinical skills of human factors, ergonomics, and applied Physiology. These scientific groups and associations include the American Society of Biomechanics, the International Society of Biomechanics, the International Society of Sports Biomechanics, the American Academy of Orthopedic Surgery, the American College of Sports Medicine, Stapp Conferences, and others.

In 1992, ASTM Committee F-8, along with representatives from the other professional groups, initiated the planning to organize an international symposium on head and neck injuries in sports that would assemble a group of scientists in various disciplines to participate in this event. In May of 1993, the international symposium was conducted in Atlanta. However, it is extremely important that on a frequent and repetitive cycle, a review and summation of information and data be compiled by all personnel concerned with the topic of this symposium.

An important focus of the Symposium was on the epidemiology of head and neck injuries in sports. The article and presentation of Kenneth S. Clarke entitled, "The Critical Role of Epidemiological Studies in Assessing the Frequency and Causation Factors in Sports-Related Injuries," presented and published in *Safety in Ice Hockey, ASTM STP 1050*, had previously established the standard and parameters for the professional field of epidemiology. This standard was applied by such authors as Drs. Dick, Bixby-Hammett, Mueller, Clarke, and others in their excellent presentations and critical reviews published in the epidemiology section of this STP, *Head and Neck Injuries in Sports*.

In addition to epidemiology and the critical review of the data and information in this reservoir of information, the symposium also had these objectives:



1. Review and evaluate the effectiveness of factors related to safety, "Risk Factors."
2. Determine whether these safety factors could be modified/improved to reduce injury rates, while in the process, not adversely modifying or affecting the basic nature of the physical activity or sport in which the injuries occurred.

In the symposium, high priority and consideration was also given to presentations concerning the "Mechanism of Injury," with emphasis on the application of biophysics, mechanical engineering, biomechanics, and bioengineering. The role of the medical clinician, both on-field and within the laboratory, is considered to be an integral aspect in correlating, integrating, and establishing the factors involved in the "Mechanism of Injury." This is true for both the anatomical areas addressed in this symposium, the head and the neck, or both.

The presentations published cover a broad spectrum of sporting activities including ice hockey, football, baseball, swimming and diving, equestrian, soccer, gymnastics, and others. Topics such as playing facilities, playing, and protective equipment were also addressed. Other relevant and associated factors (for example, in the sport of equestrian, the Horse) are also reviewed, analyzed, and assessed by the various authors and symposium presenters. Examined as a whole, it can be seen that these articles serve to reveal the very complex nature of the subject of head and neck injuries in sports.

Although the views expressed within the articles and presentations generated by this symposium are those of the authors of the various papers, and while their readers may or may not agree with the methods used in their analysis or the conclusions drawn, such presentations will undoubtedly foster additional investigation and application, thereby ultimately improving safety in the field of physical activity. It is the resolution of these differing views coupled with new findings that will inevitably emerge in the future, which forms the basis of ASTM consensus standard philosophy and its review process.

Despite the broad spectrum of topics covered in this international symposium, it is important to note that there are areas in the applied sciences that are not included in this volume but that need to be further explored, expanded, and applied. The head and neck deserve attention, and the protection of these areas should continue to be a prime subject for the on-going evaluation and application of new data and information, including the application of data concerning newer products and materials for head protection. For example, research regarding the unresolved problem of trying to protect for both linear as well as angular acceleration in head protection needs to be continued. Another area that needs further study is the question of whether neck rolls, shoulder pads, or some other method of neck protection can be of value or even considered in the cervical/neck area. The application of technology is a dynamic process that needs to be constantly reassessed and evaluated.

It is the steering committee and the leadership of ASTM Committee F-8 on Sports Equipment and Facilities' recommendation that this volume will serve as a significant catalyst and stimulate the scientific aspects of data and information on this important subject from interdisciplinary groups. This will continue to promote safety and decrease risk factors through better equipment, facilities, and knowledge of the mechanism of injury. The on-going evaluation of the constant changes that occur with the playing and participating in a physical activity, whether it be leisure, recreational, wellness/fitness, or a competitive athletic contest, is a major factor in the success of protection in head and neck injuries in sports.

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