



THE NATIONAL OPERATING COMMITTEE
ON STANDARDS FOR ATHLETIC EQUIPMENT

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MEMORANDUM

TO: NFL Team Physicians
FROM: Glen Meredith, Ph.D., Executive Director
SUBJECT: Status Report
DATE: January 27, 1993

Please find enclosed a copy of the current NOCSAE research report. This report is provided as part of a grant from the NFL Charities to NOCSAE.

GM:jdm

c: Paul Tagliabue
John Miller, M.D.



NOCSAE Research Status Report

Voigt R. Hodgson, Ph.D.
January 26, 1993

Temporal Mandibular Joint (TMJ) Protection: Williams (1) has pointed out that temporomandibular disorder (TMD), which can affect mandibular opening, swallowing, chewing, hearing, headaches, concussion tolerance, balance and physical strength, as well as neck, shoulder, arm and finger pain and numbness, is one of the health hazards uniquely associated with contact sports such as football due to helmet blows. Any blow to either helmet or face mask is transmitted to the TMJ through the chin strap.

NOCSAE research in this area involves having Dr. Williams present his experience with the disorder including radiographic diagnosis, treatment and most importantly, prevention. He has found fractures of the bones in the vicinity of the jaw joint in 95% of football players examined. We will be examining the TMJ protector in the lab, when one of our medium sized head models is modified with TMJ force transducers. In the meantime, a field study was conducted in the 1992 season at the high school level to determine the guards' practicality and effectiveness in football. Results were very favorable. The guards lasted all season with very good player acceptance and no headaches, which had been a common complaint previously. No concussions were experienced in their nine game season. Two JV players which had experienced concussions in the early part of the season were fitted with TMJ protectors and had no further problems.

When the new head model is soon completed, it will be used to not only evaluate TMJ protectors, but all types of mouthguards, methods of helmet retention, and in the face mask standard test. At present the mask is not allowed to touch the face, usually the chin, for 36 inch drops of a medium sized head model wearing a helmet and mask, with the mask contacting a rigid anvil. This criterion has in the past, required modifications to prevent some masks from touching the face in this test, despite being popular even at the pro level. Under a proposed revision to the face mask standard, the no touch requirement would be replaced by a more justifiable and quantitative TMJ force criterion, significantly below known mandible fracture levels.

Reference

1. Williams, E.D., Athlete's Jaw Disorder as it Relates to the Vital Cranial Triad, 1991, 1432 East Washington Lane, Philadelphia, PA 19138

Tooth & TMJ Force Measures For Drops Onto Lower Front of
Plastic Full Cage Faceguard
Medium Head With Custom Boll & Bite Mouthguard
5/17/93 Data

Drop Ht. Ht-in	Force Transducer Location							SI	G
	1	2	3	4	5	6	7		
60	365	205	20	20	14	181	283	415	81
60	375	200	59	25	51	188	334	445	103
60	390	203	50	25	48	175	282	443	93
Average	377	203	23	23	38	181	300	434	92
Std. Dev.	13	3	20	3	21	7	30	17	11

peak resultant TMJ force either side = 428 lb, ave; guard hit chin

Tooth & TMJ Force Measures For Drops Onto Lower Front of
Plastic Full Cage Faceguard
Medium Head With Standard Boll & Bite Mouthguard
5/17/93 Data

Drop Ht. Ht-in	Force Transducer Location							SI	G
	1	2	3	4	5	6	7		
60	380	198	11	30	3	186	304	376	87
60	390	208	10	33	12	226	398	548	104
60	400	221	6	25	9	231	392	530	104
60	360	166	13	54	19	170	328	364	89
Average	383	198	10	36	11	203	355	455	96
Std. Dev.	17	23	3	13	7	30	47	98	9

peak resultant TMJ force either side = 431 lb, ave; chin touch

Tooth & TMJ Force Measurements for Drop Tests Onto Lower Front of
Plastic Full Cage Faceguard
Medium Head Wearing TMJ Mouthguard
5/13/93 Data

Drop Ht. Ht-in	Force Transducer Location						SI	G
	1	2	3	5	6	7		
60	158	177	95	73	173	167	427	80
60	144	142	82	64	131	138	379	74
60	158	167	83	64	184	158	482	93
Average	153	162	87	67	156	155	423	82
Std. Dev.	8	18	7	5	22	15	42	10

peak resultant TMJ force either side = 222 lb, ave; guard hit chin

Force Transducer Locations On Mandible



