

アスリート向け高性能スポーツ・マウスガードの開発 —ガラスファイバー強化型新規材料の創製と応用—

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Development of High-Efficiency Athletic Mouth Guard for Athletes —Invention of New Mouth Guard Materials Reinforced with Fiberglass Cloth and Application —

by

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ABSTRACT

It has been already confirmed that mouth guard (MG) requires to be fabricated more thinly with better shock absorption. A method of reinforcement with fiberglass was taken to apply in MG material for improvement. The purposes of the present study

are as follows; 1) evaluation a fiberglass reinforced thermoplastic MG material by its flexural properties and the bonding strength with the base MG material which was ethylene-vinyl acetate co-polymer and 2) confirmation the ease of clinical application with focus on a fiberglass reinforced MG material by which a new type of MG may easily be fabricated.

A fiberglass reinforced MG material was made successfully by embedding five layers of fiberglass clothes on the both side of base MG sheet by pressing with metal hot plate and vacuum machine. It had better bonding strength with the base MG material, and also its flexural properties were improved drastically.

A prototype MG sample used with a fiberglass reinforced MG material could easily be fabricated. This mouthguard sample showed almost same shock absorption ability in the tooth distortion compared with a conventional laminated type of MG made of the base MG material.

Reinforcement of MG material with fiberglass could be improved by physical properties and kept adhesion capabilities to base MG material. We could confirm the prospect of clinical applications of fiberglass reinforced thermoplastic material as MG material. Future investigation should be carried out to be satisfied the requirement for the fabrication of MG more thinly with better shock absorption.

要 旨

薄くて装着感を向上させかつ強度および衝撃吸収能力が維持・向上するスポーツ・マウスガード(MG)製作を目指し、スポーツ・MG材料へのガラスファイバーにて強化する方法を応用した新規材料の開発に関する基礎的研究を行った。

真空ポンプ吸引下で加熱・圧接することで従来MG材料にガラスファイバーを埋入し、新規材料を創製した。新規材料の基礎的物性評価として、3点曲げ試験から曲げ強度の飛躍的向上を、剥離試験から従来材料との接着性を確認した。

創製した新規材料を用いて、プロトタイプMGを製作したところ、成形性は良好で臨床応用が可能と考えられた。しかし、装着による耐衝撃時の歯のひずみ抑制効果は向上が見られなかった。今後、飛躍的に向上した機械的性質を生かして構造

を工夫することで、ガラスファイバー強化型のMG材料をアスリート向け高性能スポーツ・MGに臨床応用が可能となっていくと考えられた。