Loading cases were considered for two conditions. Firstly, a simulation loading of when the brace is put on and taken off the patient's trunk. In this case the brace is loaded by bending in the horizontal direction. The second loading case simulated the internal pressure from an asymmetrical body shape for the interface between the body and the brace. Pressures are generally scattered on the overall torso. But pressures higher than threshold of 4.000 Pascal are on five distinct regions of the patient's trunk: right thoracic, left lumbar, abdominal, right and left side of the pelvis [7].

Suggested new materials are, as mentioned above, thermoplastic composites. In this case continuous fibre reinforced thermoplastic matrix. Regarding mechanical properties required for this application the dispersed phase is made from glass and carbon fibres. The chosen thermoplastic matrices had to correspond to the ones which are currently used and available in range of thermoplastic composites, to the range of required melting temperatures, stability and mechanical and physical properties. Thus the selected ones were polypropylene (PP), polyamide 6 (PA6) and polyamide 66 (PA66), see TABLE 1.

TABLE 1. Evaluated materials.

Material	Orientation
Co-polymer Polypropylene	-
Roving Glass 45% / PP	80:20
Roving Glass 45% / PA6	80:20
Carbon 45% / PA66	100:0

Results

The finite element analysis gave results of optimal wall thickness for these new composite materials. For the consideration of what material to use the density and consequently the weight of the particular composite has to be evaluated together with the economic aspect. It is well known that carbon composites are much more expensive than the glass composites but they can offer higher mechanical properties with higher weight reduction which results in a thinner material and therefore a thinner brace.

The manufacture of the brace from this new material requires a different processing method and the results of research carried out to date into a new manufacturing process is very encouraging. At the time of writing it is patent pending. However, the new process will make the production of the brace much less labour intensive.

Acknowledgements

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METHODS FOR FUNCTIONAL STATE EVALUATION OF THE III BRANCH OF TRIGEMINAL NERVE FOR RABBITS WITH ELECTRODONTOMETRY IN EXPERIMENT

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Introduction

Last decades, they observed permanent increase of traumatic injuries of peripheral branches of the trigeminal nerve due to: 1) facial bone fractures (93%), 2) iatrogenic injuries (7%) [1]. Neuroreflex disorders related to the trigeminal nerve branches injuries have the main role in the pathogenesis of the big part of complications in traumatic injuries and surgical operations of the facil bone [6]. Methods for evaluation of the functional state craniocerebral nerves: facial, glossopharyngeal, optic nerves [5, 8], are well described in the in the medical literature. But description of the available methods for objective evaluation of the functional state of trigeminal nerve system totally and its peripheral branches particularly in experiment and in clinic is not found. It is well known that passive electric properties of skin are determined by there morphological structure and depend on the functional state of the underlying tissues [7]. Before, for diagnostic purposes they used level changes and bilateral asymmetry indices of the skin potentials in projection of peripheral branched of trigeminal nerve outlet. Changes of the mentioned electrophysiological parameters show pathological process development when peripheral branches of the trigeminal nerve are damaged [3]. Taking into consideration that innervations of skin and mucous tunic of the under lip, mucus tunic of the alveolar appendix are provided by the inferior alveolar nerves, examination of electrosensitivity (ES) of soft tissues innervated with inferior alveolar nerves by application of the electric current as irritant, could be used as one of indices of its functional activity. The nature of the test consists of the skin nerves receptors irritation with electric current provided by an electroodontodiagnostics device when before-threshold (provided) sensation – pricking [4] is achieved by certain electric current. Our days, acupuncture is considered as physiological method correction of the disturbed functions [2]. But there is no information in the special medical literature about study of the functional state rehabilitation of the trigeminal nerve peripheral branches in traumatic injuries of the trigeminal nerve in different time of treatment when acupuncture applied as part of the complex treatment.

The aim of the work is to elaborate methods for the functional state evaluation of the injured inferior alveolar nerves in experiment and to study the process of the functional state of the inferior alveolar nerve restoration in experiment, to make comparative appreciation of restoration results for standard treatment and treatment combined with acupuncture.

Objectives and methods

We examined 8 healthy rabbits of breed Shinshilla. Examination was performed with device «Averon ЭОТ-01». Passive electrode was placed behind the cheek, the probe was put on the soft tissues, innervated with inferior alveolar nerves (mucous tunic of the alveolar appendix under the incisor of the lower jaw, upper lip) on the side of the injured nerve and on the healthy side (FIG. 1).

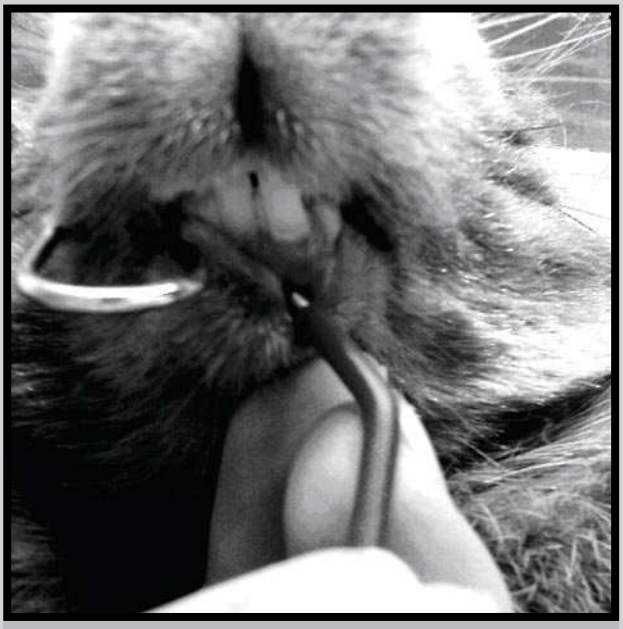

FIG. 1. ES indices checking of the soft tissue of the upper lip in experiment.

We fixed indices showing the light trembling of the upper lip of the animal. Model of the traumatic neuritis of the inferior alveolar nerves was made on the 16 animals, divided into 2 groups in 8 rabbits per group. Group «A» had standard antiphlogistic treatment course, group «B» had the same treatment combined with acupuncture. Checking of the ES indices of the soft tissues of the upper lip of rabbits was performed in different days: 3-4 days after the operation which caused nerve trunk injury, 7 and 14 days later. Evaluation of the ES indices of the soft tissues innervated by inferior alveolar nerves was done according to the coefficient of asymmetry of electrosensitivity (C_{as}) calculated by the formula:

$$C_{ac} = (ES_2 - ES_1) / ES_1$$

where ES_1 – electrosensitivity of the soft tissues of the healthy side, ES_2 - indices of the side of inferior alveolar nerves injury.

Results

When examining 8 healthy rabbits, mean value of the electrosensitivity made 44,3±2,63 мкА. Indices of the ES in the group «A» consisted 84,88±18,9 мкА by 3-4 day, in the group «B» - 79,4±20,63 мкА. Indices of the both groups were authentically different from the initial indices ($p<0,001$), but there was no significant difference between indices of the groups. The mean value of ES consisted 81,0±11,2 мкА in the group «A», in the group «B» - 65,5±10,08 мкА ($p<0,05$) by 7 day. The mean value of ES consisted 81,6±10,0 мкА the group «A», in the group «B» - 55,0±7,33 мкА by 14 days. Indices have no difference with indices of the first examinations ($p<0,01$). Indices change of ES is shown in the FIG. 2.

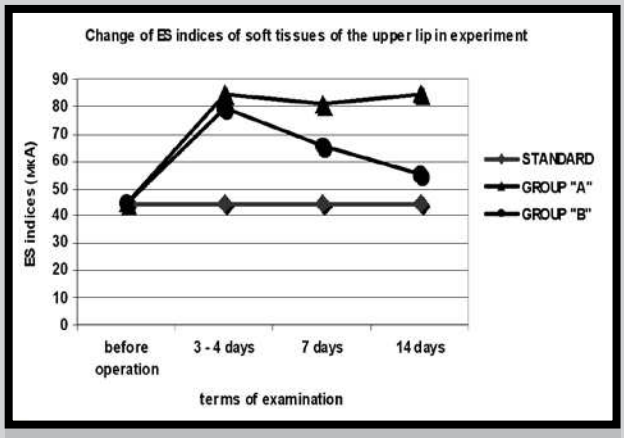

FIG. 2. ES indices of the soft tissue of the upper lip in experiment.

Conclusion

1) achieved results let to make conclusion about advisability of the electroodontodiagnostics devise application for study of the indices of the functional state of the inferior alveolar nerves;
2) indices for restoration of the functional state of the inferior alveolar nerves when acupuncture was applied in the complex treatment in experiment by ES indices level and coefficient of asymmetry electroexcitability of the soft tissues innervated by inferior alveolar nerves, are authentically different from indices when standard treatment applied only.

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