Dental and skeletal changes during pressure garment use in facial burns: a systematic review

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CRD summary
This review evaluated craniofacial effects of prolonged pressure garment use for managing facial burns. The authors found differences in expected growth patterns for children with full or partial face burns based on one small study. Thus, the authors’ assessment that the available evidence did not support any conclusions regarding craniofacial effects of pressure garments is likely to be reliable.

Authors' objectives
To evaluate dental and skeletal changes associated with prolonged use of pressure garments for treating facial burns.

Searching
Databases including MEDLINE, Lilacs, EMBASE, Web of Science, Cochrane Database of Systematic Reviews, Cochrane Controlled Trials Register, DARE and ACP Journal Club were searched from 1950 to March 2007. Search terms were described. Articles published in any language were eligible for inclusion. Reference lists of selected articles were handsearched.

Study selection
Clinical trials involving patients with facial burns who were treated with pressure garments were eligible for inclusion. The outcomes of interest were broadly defined as dental and skeletal changes measured with facial radiographs (frontal and lateral cephalograms).

The included patients were children with total face burns or partial face and/or neck burns admitted to a university burn center between 1988 and 1991. At baseline, their ages ranged from 4.5 to 9.5 years. All of the children underwent excision and grafting with thick, split-thickness sheet grafts 10 to 14 days after the burn events. Pressure garments applied to the grafts remained in place from just after surgery until graft maturation. Children wore a range of masks and other devices depending on the location of the graft. Dental and skeletal changes were assessed during clinical dental exams, which included panoramic roentgenograms and cephalograms taken three times (at hospital discharge, approximately six months after discharge and at discontinuation of pressure garment use). Follow-up roentgenograms were taken on average 6.8 years after the burn event (see Other Publications of Related Interest). Changes were observed by superimposing consecutive cephalograms.

Two researchers independently selected studies according to the stated inclusion criteria. Differences were resolved by discussion.

Assessment of study quality
The authors did not state that they assessed validity. However, they considered the effects of small sample size and lack of a control group in their discussion.

Data extraction
The authors extracted qualitative information regarding maxillary and mandibular growth, vertical height of the lower face, orientation and crowding of teeth and symptoms of temporomandibular joint dysfunction.

The authors stated neither how data were extracted for the review nor how many reviewers performed the data extraction.

Methods of synthesis
The authors narratively synthesised two articles.
Results of the review
Two articles based on one longitudinal study were selected for review. One article followed children until discontinuation of pressure garments and the other followed the same children for several more years. The study involved six children: three with total facial burns (two boys and one girl) and three with partial face or neck burns (two boys and one girl).

Total Face Burns: The direction of mandibular growth was more inferior than normal growth. During pressure garment use, total face masks affected horizontal more than vertical maxillary growth. At follow up, an increase in vertical height of the lower face was observed, but maxillary and mandibular anterior inferior growth tended to return to normal. Teeth were increasingly crowded over time.

Partial Face Burns: Inferior growth of the mandible was slightly reduced when compared to expected growth. Increased protrusion of anterior teeth was observed when pressure garment use was discontinued and at follow up.

Temporomandibular Joint (TMJ): Some children experienced TMJ symptoms.

Authors’ conclusions
The available evidence did not support any conclusions regarding craniofacial effects of pressure garments used to treat burns of the face.

CRD commentary
The research question was clearly defined with respect to study design, patients and intervention. However, what would constitute objective verification of dental and skeletal changes appeared to have been specified after the initial screening of retrieved abstracts, which may have introduced selection bias. The authors searched several relevant databases and planned to contact authors of primary articles for further information if necessary. They controlled potential language bias by not limiting the language of publication.

The authors discussed the likelihood that the one included study of dental and skeletal effects of pressure garments used to treat children who had suffered full or partial facial burns was not representative of the population of burn patients, which meant that the results may not generalise to other types of patients. Moreover, the authors pointed out that this longitudinal study did not have a concurrent control group for comparison other than the small number of children serving as their own controls over time. This was a considerable drawback, as normal developmental changes could not be measured for comparison. The authors’ conclusions regarding the constraints imposed by the scarcity of studies and weak evidence for craniofacial effects of pressure garment use for burn management are likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that an orthodontist should be a member of the burn team and that children should be evaluated by an orthodontist as soon as they were medically stable. If neck conformers or chin straps were used for a prolonged period, then an intraoral acrylic splint should be used to maintain occlusion. The authors’ several other recommendations were not based on the one study included in the systematic review.

Research: The authors stated that the effects of both pressure garments and plastic masks on hypertrophic scarring of the face and neck should be studied. For ethical reasons, the best design for studying treatments for facial burns was a cohort study with a carefully selected comparison group to control for normal craniofacial and dental changes.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.