Title: RADIOTHERAPY BITE BLOCK

Abstract: This invention relates to the field of applying external beam radiotherapy to the oral cavity. The invention provides a top portion (20) arranged to support the maxilla of a patient and having a front portion (4a) arranged to extend outside the patient's upper labia and a rear portion arranged to fit inside the patient's upper dentals; a bottom portion (30) arranged to fit inside patient's mandible and having a front portion arranged to extend outside the patient's lower labia and a rear portion arranged to fit inside the patient's lower dentals; and a bridging-portion (10) to be positioned outside the patient's mouth and extending between the maxilla and mandible to the front of the labia such that the top portion and bottom portion are spaced apart by the bridging portion. A bite block (1.6) utilising such a frame (1) and a method of manufacturing a bite block is also provided.
RADIOTHERAPY BITE BLOCK

BACKGROUND

a. Field of the Invention

This invention relates to the field of applying external beam radiotherapy to the oral cavity.

The aim of planning a course of radiotherapy treatment is to deliver a homogeneous dose of radiation accurately to a target area, and to minimise the effect on the surrounding tissues.

Radiotherapy treatment around the oral cavity can cause inflammation of the mucus of the mouth (mucositis) and dry mouth (xerostomia). If the patient can be accurately positioned for repeat sessions of radiotherapy then such side effects can be minimised. Benefits will also include the reduction of dental decay (caries) caused by radiation and death of the bone tissue as a late side effect of radiation (ostioradionecroses).

In planning treatment for head and neck cancers it is necessary to perform each session of radio therapy with the patient in an identical position (as far as is possible) for each session. This can be problematic for treatment of the head area, in particular for the oral cavity as the patient’s lower jaw and tongue are inclined to change position even when the head is held securely.

b. Related Art

In the treatment of oral cancers a face mask is used in conjunction with a bite block to open the jaws and depress the tongue. This helps to ensure a repeatable position during each session. There are various prior art bite blocks. One simple
type uses a silicone putty or impression material which is inserted into the patient’s mouth with a tube inserted through to allow the patient to breath. The tube may include a flap which serves to depress the tongue. This simple bite block is uncomfortable for the patient to use and does not position the tissues accurately enough to allow reproducible radiotherapy. Hence the set up margins of the treatment must take this inaccurate positioning into account.

A more complex version uses oral impressions to make a custom made bite block. However, the bite block must be made and fitted prior to treatment, and consequently delays to the treatment may be incurred.

Prior art mouth props in the field of human and veterinary dentistry are also known. However, such devices are relatively complex due to the need to prop open the patient’s mouth whilst also allowing access to the patient’s oral cavity by the dentist, and repeatable positioning of the patient’s perioral tissues is not really an issue.

Therefore, it is desirable to provide a bite block which is simple to manufacture, which will ensure reproducible positioning of the patient’s oral tissues and which can be simply customised for each patient without incurring treatment delays.

SUMMARY OF THE INVENTION

According to the invention there is provided a bite block frame for use in oral radiotherapy comprising: a top portion arranged to support the maxilla of a patient and having a front portion arranged to extend outside the patient’s upper labia and a rear portion arranged to fit inside the patient’s upper dentals; a bottom portion arranged to fit inside patient’s mandible and having a front portion arranged to extend outside the patient’s lower labia and a rear portion arranged to fit inside the patient’s lower dentals; and a bridging portion to be positioned outside the patient’s mouth and extending between the maxilla and mandible to the front of the labia such that the top portion and bottom portion are spaced apart by the bridging
portion.

It is an advantage if the top portion and the bottom portion each have a stop portion arranged to rest on the patient's upper and lower labia respectively such that the bite block frame is prevented from entering the patient's oral cavity for example during swallowing, or while the patient is under anaesthetic.

Preferably the frame further comprises curves to accommodate the patient's labia, and/or a tongue depressor and/or channels to accommodate a patient's teeth.

In the preferred embodiment the bite block frame comprises a single strip of radio translucent material which makes the frame extremely simple to manufacture. Preferably the strip is substantially 2mm thick and 12mm wide.

A customised bite block may be created by using such a frame together with an impression material bonded to an inner surface of the bite block frame to bond the top portion to the bottom portion and to give a fixed separation. It is also possible to incorporate such impression material into any tooth channels.

According to another aspect of the invention there is also provided a method of manufacturing a bite block comprising the steps of: heating a radio translucent thermo plastic material and forming the material on a jig to form a bite block frame as described above; inserting a malleable impression material between the top and bottom portions of the frame; inserting the frame and the malleable impression material into the mouth of a patient; removing the bite block once the malleable impression material is hardened.
BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 illustrates a perspective view of a bite block according to the present invention;

Figure 2 illustrates the bite block of Figure 1 with a radio translucent material insert; and

Figure 3 illustrates a side view of the bite block of Figure 1.

DETAILED DESCRIPTION

Referring now to Figure 1, a bite block frame 1 is formed from a single piece of radio translucent plastic and comprises a top portion 20 a bottom portion 30 and a bridging portion 10.

The plastic is formed to the desired frame shape by heating the material and forming it to a preformed jig. In the preferred embodiment the plastic is 2mm thick and 12mm wide.

The top portion 20 fits under the top jaw (maxilla) of the patient, the bottom portion 30 fits above the bottom jaw (mandible) of the patient and the bridging portion 10 serves to keep the jaws of the patient apart in a fixed separation.

The top portion 20 has a stop means 4a, and the bottom portion 30 has a corresponding stop means 4b. The stop means 4a, 4b serve to prevent the bite block from entering the patient’s mouth, for example when the patient swallows.
The top portion 20 has a curve 3a for the patient’s upper lip (labia), and the bottom portion 30 has a corresponding curve 3b for the patient’s lower lip (labia).

The top portion 20 has a channel 2a for the patient’s upper dental, and the bottom portion 30 has a channel 2b for the patient’s lower dental.

The bottom portion 30 optionally has a tongue depressor 5 which serves to hold the patient’s tongue against the bottom of the patient’s mouth (mandible) whilst the radiotherapy is in progress. The tongue depressor could be shaped other than shown in the Figures.

Referring now to Figure 2, a radio translucent impression material such as Aquaplast RT™ Thermoplastic which comprises 2-Oxepanone, polymer with 1,4-butaneediol (also know as Adapt-it™ which come in the form of pellets) is immersed within water at 70 degrees centigrade to form a malleable compound and inserted in the space between the top portion 20 and the bottom portion 30 in order to bond the top portion and the bottom portion together. Impression material may also be inserted into the channels 2a and 2b to gain an impression of the patient’s teeth. The bite block is located in the patient’s mouth and the patient inserts their teeth into the channels 2a and 2b, forming dental impressions within the impression material (if used). The patient ensures that the tongue is under the tongue depressor 5 and that the teeth are located correctly in the grooves 2a and 2b.

The radio translucent material 6 hardens, the device is removed from the patient’s mouth, and any excess material is cleaned from the bite block.

This method provides a simple customised bite block thus allowing repeatable radiotherapy to be performed in subsequent sessions.

Once the mouth prop has been customised the bridging portion may be attached to a face mask for keeping the patient’s head in a fixed position in order to facilitate repeatability of the positioning of the patient’s oral cavity.
It will be understood that various alterations, modifications, and/or additions may be introduced into the constructions and arrangements of parts described above without departing from scope of the present invention as defined in the appended claims.
CLAIMS

1. A bite block frame for use in oral radiotherapy comprising:
   a top portion arranged to support the maxilla of a patient and having
   a front portion arranged to extend outside the patient’s upper labia and a
   rear portion arranged to fit inside the patient’s upper dentals;
   a bottom portion arranged to fit inside patient’s mandible and having
   a front portion arranged to extend outside the patient’s lower labia and a
   rear portion arranged to fit inside the patient’s lower dentals; and
   a bridging portion to be positioned outside the patient’s mouth and
   extending between the maxilla and mandible to the front of the labia such
   that the top portion and bottom portion are spaced apart by the bridging
   portion.

2. A bite block frame according to claim 1, in which the top portion and the
   bottom portion each have a stop portion arranged to rest on the patient’s
   upper and lower labia respectively such that the bite block frame is
   prevented from entering the patient’s oral cavity.

3. A bite block frame according to any one of the preceding claims, in
   which the frame further comprises curves to accommodate a patient’s
   labia.

4. A bite block frame according to any one of the preceding claims further
   comprising a tongue depressor.

5. A bite block frame according to any one of the preceding claims, in
   which the frame further comprises channels to accommodate a patient’s
   teeth.

6. A bite block frame according to any one of the preceding claims, in
which the frame comprises a single strip of radio translucent material.

7. A bite block frame according to claim 6, in which the single piece of radio translucent material comprises a strip which is substantially 2mm thick and substantially 12mm wide.

8. A customisable bite block comprising a frame according to any one of the preceding claims and an impression material suitable for bonding to an inner surface of the bite block frame to fix the position of the top portion relative to the bottom portion.

9. A bite block comprising a bite block frame according to claim 5, and further comprising an impression material suitable for inserting in said grooves.

10. A method of manufacturing a bite block comprising the steps of: heating a radio translucent thermo plastic material and forming the material on a jig to form a bite block frame according to any one of claims 1 to 7; inserting a malleable impression material between the top and bottom portions of the frame; inserting the frame and the malleable impression material into the mouth of a patient; removing the bite block once the malleable impression material is hardened.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61B19/00
ADD. A61B13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B A61F A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search: 31 January 2007

Date of mailing of the international search report: 12/02/2007

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Authorized officer: Hübner, Jens
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