

Short communication

Training simulation for oral and maxillofacial surgeons based on the techniques of arthroscopy in the temporomandibular joint

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Abstract

Arthroscopy is a diagnostic-therapeutic technique used in the treatment of disorders of the temporomandibular joint (TMJ). The difficulties of arthroscopy lie in the manipulation of the tools, which is why training in the technique of triangulation in artificial models is essential. We developed a training system based on the techniques of arthroscopy in the TMJ, using simulators. The first simulator was a metal box containing three holes for insertion of the instruments, and the second was a human artificial model made of polymers. We found that they facilitated training in the techniques of arthroscopy, which subsequently reduced operating time and led to a better execution of skills in reality. © 2019 The British Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Keywords: Temporomandibular; arthroscopy; simulation-based surgical training

Introduction

A recent study published in this journal made public the results of a web-based survey which assessed the opinions of trainees in oral and maxillofacial surgery (OMFS) on simulation-based surgical training.¹ Overall it proved that the trainees had a wide interest in having OMFS-related skill-based courses, but that these courses tended to be expensive.

A wide-spread interest in making these simulation-based courses more accessible in the UK will definitely improve education and training.^{1,2} We think that an area that requires a steep learning curve in OMFS is arthroscopy of the temporomandibular joint (TMJ).^{1–3}

Our aim was to introduce a new, accessible, simulation-training method to our OMFS trainees for minimally-invasive procedures in the TMJ. The BAOMS/RCS commissioning guide for TMJ disorders states that few patients can be

referred elsewhere for their TMJ dysfunction. As about only 20% of OMF surgeons (or probably fewer) are trained in arthroscopy, this results in different degrees of surgical experience among trainees not only in the UK but all over the world.⁴

Material and methods

A first-stage model was constructed using a small box with three holes (2.5 mm in diameter) that were triangulated 12 mm apart.^{5,6} These allowed the trainee to introduce the arthroscope and the instruments. Inside the box, there were two baskets (13 mm deep) with several craft-foam objects in two different colours are scattered inside (Fig. 1). The exercise involved using 3-dimensional triangulation to move each colour into a separate basket.

A second model was constructed using a well-defined, anatomical plastic skull model with an articulating jaw, and both TMJs were customised with craft foam. The model was

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Fig. 1. Box simulator. Three holes are pierced in one side of the box. Two baskets are located inside with scattered objects to gather and collect into each box.



Fig. 2. Plastic skull model simulator.

then dressed with a facial mask to simulate the skin and to allow the best triangulation possible to be located by palpation. Once inside the TMJ, the trainee could attempt to recognise each anatomical structure (in different colours) and practise basic techniques. (Figs. 2 and 3). Both exercises were tested by four trainees, who were interviewed afterwards. A total of US \$50 was all that was necessary to build both models.

Results

Simulation proved to be an economical way of providing the trainees with a life-like experience and, in their opinions, increased their confidence and surgical dexterity when later tackling the procedure in real life. They all also agreed that the use of the first exercise facilitated the 3-dimensional navigation in the second.

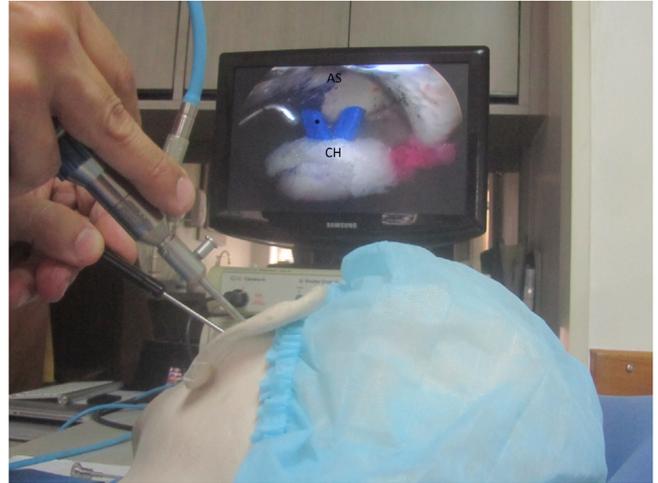


Fig. 3. Arthroscopically visualisation of the skull model, CH = articular surface of the condylar head. Blue foam simulating intra-articular adhesions marked with a * and AS = the articular surface of the glenoid fossa.

Discussion

Takagi, in 1933, instigated arthroscopy, but the first arthroscopy reported in small joints, was not until 1980.⁵ It is a procedure that provides knowledge of how to treat dysfunction of the TMJ, and its complexity lies in the technique because the TMJ has a volume of just 0.9 ml in the inferior joint space and 1.2 ml in the superior.^{6–8} Many arthroscopic approaches have been used to get into the TMJ space, such as the Mukarami, the inferior posterolateral, anterolateral, inferior anterolateral, and endoaural.^{7–9} The practice of triangulation allows access to the joint with the use of two ports.¹⁰ This two-stage exercise allowed the trainees to synchronise their fine motor skills before proceeding to a real TMJ.

Based on our own experience, we think that the use of this simulation technique will allow all OMFS trainees to increase their confidence and improve their surgical skills in minimally-invasive procedures in the TMJ.

Ethics statement/confirmation of patients' permission

Ethics approval was obtained. Patients' permission was not needed.

Conflict of interest

We have no conflicts of interest.

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