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Microsurgical reconstruction of the head and neck – Current concepts of maxillofacial surgery in Europe

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ABSTRACT

Introduction: Microvascular surgery following tumour resection has become an important field of oral maxillofacial surgery (OMFS). This paper aims to evaluate current microsurgical practice in Europe.
Methods: The questionnaire of the DOESAK collaborative group for Microsurgical Reconstruction was translated into English, transformed into an online based survey and distributed to 200 OMFS units with the aid of the European Association for Cranio-Maxillo-Facial Surgery (EACMFS).
Results: 65 complete and 72 incomplete questionnaires were returned. Hospitals from the United Kingdom, France, Italy, the Netherlands, Spain, Belgium, Greece, Slovenia and Lithuania participated. 71% of contributing centres were university hospitals, 87% out of these perform microvascular tumour surgery at least on a two-weekly base. Overall complication rate was at around five percent. Most frequently used transplants were the radial forearm flap and the fibular flap. The perioperative management varied widely. Success factors for flap survival, however, were uniformly rated, with the surgical skill being the most important factor, followed by the quality of postoperative management. Medication seems to play a less important role.
Conclusion: Within Europe microvascular surgery is a common and safe procedure for maxillofacial reconstructive surgery in the field of OMFS. While there is a major accordance for the surgical procedure itself and the most frequently used flaps, perioperative management shows a wide variety of protocols with low presumed impact on surgical outcome.

1. Introduction

Microsurgical reconstruction has become one key area of current oral maxillofacial surgery (OMFS) and one of the most challenging fields at the same time (Zuker et al., 1980; Wenig and Keller, 1989; Lydiatt et al., 1993; Miller et al., 1995). Due to the rapid development in this relatively new field, opening up a wide range of new options for complex situations, clear recommendations and a survey over standard concepts have not been established yet. We therefore developed a questionnaire on this topic (Mücke et al., 2011) to evaluate treatment concepts and assessing the variety of reconstructive strategies in different hospitals. Following the survey for microsurgical concepts in German-speaking countries, we expanded the survey to Europe to deliver a European perspective in this field. Do concepts and situations differ as much as the different ways to become a maxillofacial surgeon in these countries? Or do

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we follow the same concepts although coming from different backgrounds? And how much do individual situations at each hospital differ and influence these concepts?

2. Material and methods

Based on the membership database of the European Association for Cranio-Maxillo-Facial Surgery (EACMFS), 200 individual units were identified. The questionnaire of the DOESAK collaborative group for Microsurgical Reconstruction (Mücke et al., 2011) was translated into English and then transformed into an online based survey using the online survey tool SurveyGizmo (SurveyGizmo, Boulder, USA). In March 2011 within Europe, 200 OMFS units received a mail notification to participate in the survey and a link to complete the online questionnaire. Answers were collected digitally and could be extracted from SurveyGizmo via an Excel datasheet interface. Evaluation of the answers was performed after 6 months.

The first part of the questionnaire focused on general information of the participating unit acquiring the following information: number of surgeons and number of microsurgeons performing anastomoses regularly in the respective department, number of patients receiving free microsurgical flaps per year, type of free flaps and used osteosynthesis material for fixation of bony flap components. In a second part, the focus was set on the perioperative management for microsurgical patients as classified by Chen et al. (2006). Questions about the influence of perioperative management were ranked on a scale from 1 to 7 (1 = not important, 7 = most important).

Descriptive statistics for quantitative variables are given as mean and standard deviation. If appropriate, medians and ranges were also computed. Statistical analysis was performed using JMP 7.0.1 (SAS Institute Inc., SAS Campus Drive, Cary, NC, USA 27513) and Microsoft® Office Excel (Microsoft Excel for Windows, release 2007, Microsoft Corporation, Redmond, WA, USA).

3. Results

3.1. Participating departments

In total, 65 units returned a fully completed questionnaire, another 72 units returned incomplete questionnaires, equal to a response rate of 32% and 57%, respectively. For statistical analysis, only complete questionnaires were evaluated.

High response rates were seen in England, France and Italy, a detailed analysis of participating countries is given in Table 1.

Of the 65 OMFS departments, 47 were university hospitals (71%), 15 departments at non-university hospitals (23%) and three were private practices caring for inpatients (5%). The units were staffed with an average of 15 surgeons (range 3–30).

Table 1
Participating countries ($n = 65$).

Countries	Number of participating units	Microsurgery performed by CMFS surgeon	Microsurgery performed by plastic surgeon	Microsurgery performed by ENT surgeon
UK	16 (25%)	16 (100%)	0	0
France	14 (22%)	11 (79%)	1 (7%)	2 (14%)
Italy	14 (22%)	13 (93%)	1 (7%)	0
Netherlands	7 (11%)	4 (57%)	3 (43%)	0
Spain	5 (8%)	4 (80%)	1 (20%)	0
Belgium	4 (6%)	3 (75%)	1 (25%)	0
Greece	2 (3%)	2 (100%)	0	0
Slovenia	2 (3%)	1 (50%)	0	1 (50%)
Lithuania	1 (2%)	0	1 (100%)	0

Most OMFS units treat oral cavity cancer patients at least on a weekly base: less than 10 tumour patients per year – one department (2%), 10–20 patients per year – eight units (12%), 20–50 patients per year – 24 units (37%), up to 100 patients per year – 18 units (28%) and more than 100 patients per year – 14 units (22%).

Reconstructive tumour surgery including local reconstructive procedures is performed regularly by most participating OMFS units: surgery is performed 20–50 times per year by 49% of units, 12 units perform 50–100 reconstructive operations per year (18%). 15% execute more than 100 reconstructive procedures per year. Only 5 units perform less than 10 reconstructive procedures per year (8%), 7 units perform 10–20 reconstructive operations per year (10%).

The most frequently used flap is the radial forearm flap (35%), followed by fibula flap (18%) and pectoralis major flap (11%).

26 OMFS units perform 20–50 microsurgical procedures per year, 14 units between 50 and 100, 16 hospitals 10–20 microsurgical procedures per year. Only 2% of units prepare more than 100 microvascular procedures per year. 9% do not do any microvascular surgery. In 82% of the participating units the free flaps are raised by the maxillofacial surgeons themselves, in 12% by plastic surgeons and in 6% by ear nose and throat (ENT) head and neck surgeons.

If bony reconstruction is necessary, in 82% of participating units this reconstruction is performed primarily mostly in a two team approach, delayed primarily (within 14 days after resection) in 1% and secondarily (later than 6 month after resection) in 17%. Quick sections of soft tissue tumour margins are performed intraoperatively in 80% of participating units. For osteosynthesis, mostly reconstruction plates are used (65%), however in some OMFS units mini-plates (18%) or other systems (17%) are preferred.

3.2. Perioperative management

Twenty units (31%) use special preoperative management protocols prior to microvascular free tissue transfer. The most common imaging modalities are echography (29%) and computed tomography angiography (25%). The Allen's test is performed if a radial forearm flap is planned.

64% of the OMFS units anastomose arteries with the end-to-end technique whereas only 21% perform this technique for veins. Vessel interpositions are never or rarely inserted by 89% of units. In 7 units (11%) vessel grafts are often used. Most of the hospitals (78%) rinse the flap vessels and the recipient vessels (68%), with heparinized saline (45%) or pure heparin (34%). If the solution is heated (18%), the temperature is usually around 37 °C (58%). Intraoperative support after the anastomosis is administered in 38% by use of low dose heparin (42%).

Generally speaking, systemic intraoperative anticoagulation is used by 38 CMFS units (58%) and mostly by heparin (68%). Application time-points are either before ischaemia or at start of ischaemia. Nearly half of the units (41%) use corticosteroids as an additional support for swelling prophylaxis.

Postoperatively, there are a variety of drugs administered (heparin, low molecular weight heparin (LMWH), rheological and antiplatelet products) aiming to provide a better outcome. 80% of the CMFS units use low molecular weight heparin such as enoxaparin (Clexane®, Levenox®) (43%) and deltaparin (Fragmin®) (38%). Approximately one third of the units use heparin (25%) or antiplatelet drugs (31%) such as acetylsalicylacid (70%). Only 12% of the units decide to administer rheological products. However, when asked about the perceived effectiveness of the applied drugs, most units attribute only a low to moderate effect of these drugs on a scale from 1 to 7 (1 = not important, 7 = most important) (2.4–3.9, overall 3.1, see Fig. 1). The perfect intraoperative technique is rated as the single most decisive factor for flap survival