The term “surgery” is derived from the Greek words χύρω ("chir" [hand]) and ἐργον ["ergos" (work)]. According to this etymology, surgery should include any clinical work implemented with our hands. In daily clinical practice, however, the use of this word is often limited to practical therapeutic acts, such as those involving cutting soft tissue (incisions), flap raising, osteotomies and reconstruction, as well as repairing and dressing living tissue. The term “oral” pertains to the mouth (or oral cavity), and oral surgery would consequently encompass maxillary sinus membrane lifts, onlay and inlay bone grafts, the placement of dental or osteointegrated implants, exodontia (including surgical extraction of impacted teeth and tooth-like structures), as well as the incision and drainage of cellulitis, just to name a few. Despite these different fields of use, the limits of oral surgery are not yet well defined and may reach maxillofacial surgery, a term that implies a greater scope of surgical interest, such as temporomandibular joint surgery, orthognathic surgery, the treatment of head and neck trauma, as well as cancer surgery.

General dental practitioners are only required to undertake surgical treatment of teeth, tooth-like structures, and soft tissue surrounding teeth. In this regard, the UK General Dental Council defines “surgical dentistry” as those “surgical procedures within the mouth which would normally be accomplished for a cooperative patient under local anaesthesia, with or without sedation, in a tolerably short operating time.”

In the past 30 years, oral surgery has progressed significantly in the diagnosis and treatment of dental and jaw pathology. Dentistry, particularly surgical dentistry, is rapidly changing and evolving, and dentists worldwide are attempting to adapt to the revolutionary changes and new opportunities resulting from globalisation of dental and medical surgical specialties. New insights and discoveries related to oral surgery are indeed astonishing and many of these have already been applied in everyday practice, and addressed in textbooks and at international conventions.

The near future will probably witness Er:YAG laser bone ablation replacing surgical drill osteotomy in oral surgical practice. Indeed, scanning electron microscope observations have determined that Er:YAG laser treatment produces well-defined edges. Melting and carbonisation associated with Er:YAG lasers could not be observed on sites irradiated with Er:YAG lasers. In addition, Fourier transform infrared spectroscopy revealed that the chemical composition of bony surfaces after ablation with an Er:YAG laser was almost the same as that after conventional drilling with a bur, proving that the use of Er:YAG laser ablation can be an alternative to traditional bur ablation in oral and periodontal osseous surgeries, particularly in mandibular ramus onlay block harvesting, apicoectomy, cysts and benign jaw tumour surgery, or the irradiation of bisphosphonate-associated jaw osteonecrosis.

Dental pulp stem cells (DPSCs) can nowadays be cryopreserved and stored for years, while still retaining their multipotency and bone-producing capacity. These highly specialised cells show very low morbidity and are easy to collect from extracted wisdom teeth or buds, for example. They also interact with bone biomaterials and substitutes, which makes them an ideal cell population for jaw reconstruction. In addition, stromal bone-producing DPSCs, a multipotent stem cell subpopulation of DPSCs, are capable of differentiating into osteoblasts, and they are claimed to possess immune privilege and exert anti-inflammatory abilities like many other mesenchymal stem cells.

CBCT, which was introduced in the late 1990s, is becoming the main imaging armamentarium of oral surgeries, as it provides more and comprehensive anatomical information and data that help to improve preoperative and perioperative clinical implementation of the extraction of impacted teeth, cystectomies, removal of benign jaw tumours and placement of dental implants.

While oral surgery continues to develop further with new technologies and visions, the assessment and diagnosis of patients will still form the cornerstone of any surgical specialty. Decision-making, a complex cognitive process that involves consideration of surgical patients’ complaints and preferences, the availability of evidence-based data, as well as practitioners’ case-specific clinical decision-making, consequently remains an ongoing challenge for oral surgeons and dental general practitioners alike.

Inter-clinician variability and disparity in decision making are very well known in dentistry and medicine. In oral surgery, treatment recommendations, options and decisions can vary widely among practicing dentists. In many cases, they are based more on personal values and expertise than on objective, rigorous or evidence-based analysis of treatment alternatives, risks, prognosis and benefits. There are treatment guidelines for the management of impacted teeth but none for aggressive and relapsing jaw cysts and odontogenic tumors, for which documented long-term treatment success has not yet been achieved. Owing to this lack, the treatment planning process in oral surgery remains a dilemma and warrants further interest and research.

As a matter of fact, regional differences in training, education, and dental school treatment philosophy, the “schools effect”, may significantly influence decision-making processes. It seems likely that specialists are much more confident in their ability to manage surgical cases successfully. A better understanding of inter-clinician variability in collaborative decision-making will definitely help the oral health community in improving consistency and implementation of oral surgical treatment recommendations and options.

One of the most promising approaches is probably the non-surgical medical treatment of tumours and lesions of the jaws, as reported by Marx and Stern in 2003. They found a 65% per cent rate of complete resolution of central giant cell granulomas (CGCGs) in the jaws through intralesional corticosteroid injections. Decamethasone and triamcinolone are currently the most popular intralesional steroids, and the routine use of these drugs is common practice not only for CGCGs, but also for solitary jawbone lesions of Langerhans cell histiocytosis, a proliferative disease of the macrophage/dendritic cell lineage.

CGCGs, considered troublesome pathologies, are also currently medically managed by calcitonin, a polypeptide hormone produced in humans primarily by parafollicular C cells of the thyroid gland. Calcitonin is known to counteract parathyroid hormone, inhibit osteoclast activity and increase calcium influx in bones. In this regard, salmon calcitonin, which is used in postmenopausal osteoporosis, hypercalcaemia, Paget’s disease and bone metastases, is considered to be more active than human calcitonin and to be an important tool in the medical treatment of jaw tumours and lesions. The main question is whether intranasal salmon calcitonin is as effective as subcutaneous human calcitonin in the medical treatment of CGCGs of the jaws.

Finally yet importantly, many clinicians and clinical investigators have suggested that the radical treatment of ameloblastomas, odontogenic tumours well known for their aggressiveness and high recurrence after conservative treatment, for these reasons, en bloc resection with or without reimplantation, which includes a resection of at least 1-2 cm of normal jawbone beyond the tumour’s margin, has become a common practice not only for aggressive and relapsing jaw cysts and odontogenic tumors, for which documented long-term treatment success has not yet been achieved. Owing to this lack, the treatment planning process in oral surgery remains a dilemma and warrants further interest and research.

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