

# *Research on the Development Path of Oral Trauma Surgery Based on Big Data*

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**Abstract:** The progress of modern science and technology has made medical data more and more complex, rich and diverse, and biomedicine has entered the era of big data. As a product of the combination of modern imaging technology, stereotactic technology, electronic computer technology and artificial intelligence technology and medicine, digital surgery has been rapidly developed and applied at home and abroad in recent years. Through the application of big data in daily life and the quantitative relationship of oral disease data, we look forward to the future through quantifiable oral diseases and data processing. In order to fully excavate and utilize the massive data generated in the process of oral diagnosis and treatment, it is proposed to build a stable and efficient oral medical big data platform to realize the sharing and application of data from different sources. The oral medical big data platform can play an important role in oral clinical, medical research, hospital management, patient services and other aspects. The standardized training for oral and maxillofacial surgery specialists aims to cultivate theoretical knowledge and clinical skills, meticulous clinical thinking, and high-quality oral and maxillofacial surgery specialists who can independently and regularly undertake the diagnosis and treatment of common multiple diseases and difficult and severe diseases in oral and maxillofacial surgery.

## **1. Introduction**

Before the 1950s, oral and maxillofacial trauma and restorative surgery in China had not yet been established, but with the treatment of war injuries and the increasing number of work injuries, traffic accidents and other accidental injuries, the continuous development of oral and maxillofacial injury and restorative surgery[1]. With the rapid development of science and technology, health and medical big data, as a strategic resource, has played an increasingly obvious role in improving the quality of medical services, improving patient satisfaction, serving clinical and scientific research[2]. With the rapid economic growth, the increase of per capita income and the development of oral health care technology, the demand for oral medical treatment is increasing, and oral problems have become one of the most prominent health problems in China at this stage[3]. The second national symposium on oral and maxillofacial trauma was held in the ancient city of Xi'an from April 21 to 25, 2000, which was another comprehensive summary of the professional development of oral and maxillofacial trauma surgery in China and placed expectations on future

development[4]. Oral and maxillofacial surgery is a specialty of stomatology that focuses on the etiology, pathology, treatment and prevention of oral organs, facial soft tissues, maxillofacial bone tissue, temporomandibular joints, salivary glands, and certain neck diseases[5]. Oral and maxillofacial digital surgery is the concentrated embodiment of scientific and technological development in many fields in oral and maxillofacial surgery, in this new field, the collection of mechanical engineering, materials science, computer-aided design, computer-aided manufacturing Computer Aided Manufacturing (CNM) technology, laser technology and other fields of the latest achievements[6]. With the application of molecular biology, high-throughput sequencing and computer technology in the field of oncology research, biomedical big data has emerged, and medical knowledge based on big data analysis and mining is quietly changing the current diagnosis and treatment mode of oral problems. The construction of medical big data platform has been carried out more and more mature in general hospitals in recent years. However, the scope of business in stomatology diagnosis and treatment is relatively narrow, and the platform construction and research are not extensive[7]. The construction of a big data platform for stomatological care is a key measure for stomatological hospitals to innovate medical models and build digital hospitals and intelligent hospitals. In the era of rapid changes in computer technology and the emergence of new technologies and new methods, the key is to find and use the most appropriate, effective and fastest technical methods to solve the needs of clinical practical work[8].

## **2. Current Status of Oral and Maxillofacial Trauma Surgery and Application of Big Data**

### **2.1 Current Status of Oral and Maxillofacial Trauma Surgery**

Trauma is increasing year by year. Trauma as a “disease of developed societies” is increasingly threatening human health. As a result, it affects the quality of the population and its quality of life. Oral and maxillofacial trauma accounts for about 7% to 20% of systemic injuries in peacetime. Macroscopic research and scientific prevention and treatment of trauma requires the establishment of a unified injury grading, classification and analysis system. At present, it is necessary to establish a unified specialist injury evaluation standard, database transmission network and statistical analysis system, which is a valuable research direction in the field of oral and maxillofacial trauma in China. Basic research is relatively weak and needs to be improved. The basic and experimental research of oral and maxillofacial trauma started relatively late in China, although some achievements have been made in some aspects, but the overall level is not high and needs to be improved. At present, domestic research has gone from the histological level to the cellular and molecular level, but the scope is not enough. Basic research on facial nerve injury has not been carried out much in China, and only a small number of reports were reported during the country's first maxillofacial trauma conference. In the future, we should focus on basic research on the mechanism of traffic accident impact injuries, the pathology of mid-facial crush injuries, the initiating factors of traumatic arthritic rigidity, and post-maxillofacial rehabilitation engineering. Significant progress has been made in clinical treatment, but it needs to be improved.

Clinical emergency should establish a holistic concept and insist on saving lives before treating injuries. The first national conference on maxillofacial trauma proposed “dual standards of function and morphology”. At present, this concept of treatment has been widely accepted, as shown in Figure 1. Fresh fractures have developed from the original “functional reduction” to “anatomical reduction”, and old fractures have expanded from “in fracture reduction” to “dismissal correction reduction”. In 1958, there were 4 principles of fracture treatment, namely anatomical reduction, strong fixation, non-invasive surgery, and early function. China soon began to carry out this research, which largely avoids and reduces clinical dependence on intermaxillary fixation, while improving efficacy, reducing complications and shortening the treatment period. Complications

caused by strong fixation are not uncommon in the clinic, the main reason is that the use and operation are not standardized, and they need to be improved.

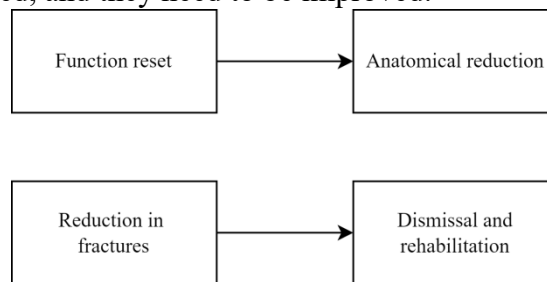


Figure 1: Functional and Morphological Binomial

## 2.2 Big Data Applications in Oral and Maxillofacial Trauma Surgery

The rapid development of medical imaging technology, image processing technology and robot technology has been gradually applied to the medical field, and has formed a new research and clinical application hotspot: computer-assisted surgery. Medical big data has a large amount of data, a variety of data formats and forms, high processing time line requirements, and strict accuracy requirements, and medical big data also comes from clinical medicine because of its data. For example, surgical navigation. Surgical navigation, the full name of image-based surgical navigation, is a branch of computer-aided surgery to provide the greatest possible surgical site information, to achieve medical images and anatomical sites, surgical areas of preoperative and intraoperative interaction. In recent years, surgical navigation systems for oral and maxillofacial surgery have been further developed[9]. A new navigation system based on X-ray and dental models of the head, which is accurate enough to meet the needs of oral implants, tumor resection, and trauma reintegration, and has a broad application prospect. Surgical navigation is important for the extent of surgical resection in patients with tumors. A biopsy of the maxillofacial mass can be performed with minimal trauma before surgery, and the lesion can be precisely removed during surgery in strict accordance with the preoperative proposed range of resection. Surgical navigation systems are widely used in maxillofacial trauma. The reduction of maxillofacial fractures by traditional surgery depends mainly on the clinical experience of the operator, and the accuracy of the alignment and the recovery of function after surgery are greatly limited. In the clinic, surgical navigation technology and laser stereotypesetting technology are used to accurately complete the incision and reduction of the fracture of the zygomatic arch of the cheekbone, ensure the complete anatomical reduction of the fracture, restore the form and function, and the method is simple and the effect is good. Surgical navigation system-guided stretching osteogenesis has been widely used in the treatment of post-traumatic malformations of the jaws. The digital diagnosis and treatment process of jaw deformities includes: clinical data collection, data processing, computer-aided surgical design and simulation, 3D printing, intraoperative navigation, etc. By operating the virtual surgery software yourself, you can quantitatively compare the effects of virtual surgery with real surgery and experience the accuracy of digital technology.

## 3. The Development Path of Oral and Maxillofacial Trauma Surgery

### 3.1 Establish a Medical Big Data Platform

The medical big data platform can realize the access, processing and analysis of relevant data generated by medical institutions in the medical process, so as to achieve the effective use of data. As shown in Figure 2, the construction of a stable and efficient big data platform requires the

platform to collect data from existing HIS (Hospital Information System), EMR (Electronic Medical Record), PACS (Picture Archiving and Communication System), LIS (Laboratory Information Management System) and other information systems, and to clean, encrypt, desensitize and other operations on the collected data. Provide clinically assisted decision support for doctors, provide more valuable data for hospital scientific research, and provide a more convenient and intelligent mode for patients' visits.

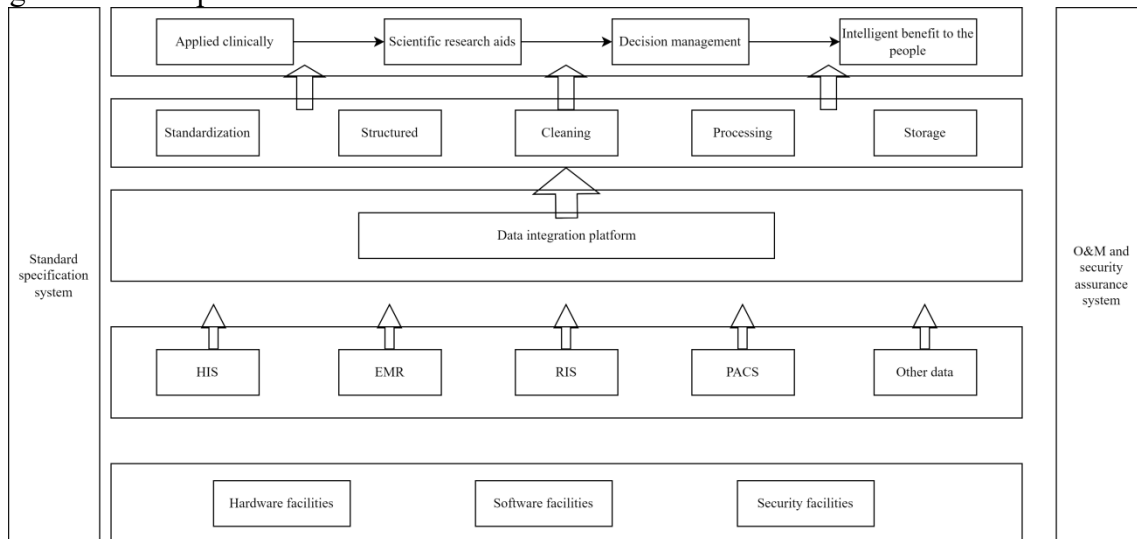


Figure 2: Oral Medical Big Data Platform

Data security is the premise of medical big data to be used, and the use of data can only be discussed if the privacy of patients is guaranteed. This includes the use of anti-virus software, firewalls, database audits and other basic security measures. Before the data is used, it is necessary to ensure that the data is desensitized and all the desensitization operations require the use of a dedicated server to further ensure the security of the data during the operation. The traditional database system is a database system that runs independently, even if the data can be imported, it is also the data exchange of the same database system, and a large amount of data information still needs to be entered by the user himself. This not only reduces the entry of duplicate data, reduces input errors, but also synchronizes clinical medical work with trauma information management. The big data platform requires basic patient information, patient prescriptions, medical record data, diagnosis, and examination and imaging reports during oral diagnosis and treatment. The data obtained from different information systems is processed by a series of big data platforms, and then applied to clinical, scientific research, teaching and hospital management after ETL mapping and data cleaning. Using the oral medical big data platform, intelligent guidance services can be provided to patients. Improve patient satisfaction by matching the most appropriate department for the patient through the patient's oral disease symptom description.

### 3.2 Talent Training of Oral Trauma Surgery under the Background of Big Data

Clinical internship is the process of medical students participating in society and combining their medical theories with clinical practice, which is an important part of higher medical education and a necessary stage for medical students to grow from students to clinical medical workers. As one of the important components of the internship of stomatology students, oral and maxillofacial surgery is the focus and difficult specialty of the clinical internship of stomatology students. Some teaching hospitals only pay attention to clinical medical treatment, and pay attention to economic and social benefits. In order to complete the heavy index task, clinicians are mainly busy with clinical

diagnosis and treatment work, and they do not have too much time to absorb new knowledge and new technologies, which makes it more difficult for them to complete the task of clinical teaching. Due to the heavy pressure of clinical work, the teacher is afraid of medical disputes, and sometimes most of the patients are introduced by acquaintances, so the teacher will often do it himself, and it is difficult for interns to have hands-on opportunities. Inpatients with oral and maxillofacial surgery have their own characteristics. The incidence of maxillofacial surgery patients is low, the number of patients in some hospitals is small, and critical diseases and difficult patients are rare, which also affects the task of clinical ward internship of stomatology students. Each patient has very high cosmetic and functional requirements for the post-operative parts, which puts a lot of psychological pressure on the clinician [10].

Teachers should continue to learn and recharge, strengthen their own cultivation and quality, improve the level of teaching, oral and maxillofacial surgery outpatient clinical practice, mainly cultivate the intern's clinical technical operation ability, encounter problems to analyze and solve problems. Develop the ability of interns to communicate with patients and ultimately gain their trust. Attention should be paid to cultivating the ability of interns to conduct reasonable and meticulous clinical physical examination, rational application of drugs, analysis of various laboratory test results, and imaging diagnosis such as ultrasound, CT, and MRI. Gradually combine the case teaching model with digital technology, and train students to use a fully digital process for each case of training students. Gradually formed a standardized training model for specialists that combines CBL and digital technology.

#### 4. Conclusions

With the continuous development of China's national economy, the general improvement of people's living standards, and the wide popularization of stomatological knowledge, higher requirements have been put forward for the service level and medical quality of the oral health service system under the existing system in China. With the rapid development of information technology and the further standardization of information system standards such as electronic medical records by the state, big data platforms will play an increasingly important role in the field of medical and health. The construction of a dental medical big data platform shows the advantages of the big data platform from multiple dimensions such as clinical, scientific research, management, and patient service, improves the service efficiency and management ability of the hospital, and provides a more powerful guarantee for the oral health of the masses. It is necessary to enhance understanding, strengthen safety protection, improve rules and regulations, and improve the standard system. The construction and popularization of the dental medical big data platform will be an important part of the informatization construction of stomatological hospitals. In the future, digital technology will become an indispensable clinical aid for oral and maxillofacial surgery. In the near future, telemedicine, computer-assisted surgery, and navigation surgery will become new surgical means in the future with the development of digital medicine.

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