ELEVATOR-SUCTION AS A NEW HYBRID INSTRUMENT IN THE CONTEMPORARY PRACTICE OF SURGICAL DENTISTRY

Sh.Yu. Abdullaev[1], A.V. Zhdanov[2], M.G. Khatypova[1], F.A. Dzhumaev[1], A.A. Hodjimetov[1]
Tashkent State Medical University[1]
Tashkent International University KIMYO[2]
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Abstract. *In implantology, the formation of a mucoperiosteal flap is an important step for obtaining the necessary access, viewing the surgical field and minimizing tissue damage. The result and injuries of periosteal detachment in the majority depend on the instruments used by the surgeon, as well as the presence of aspiration of the surgical field. This article is devoted to the analysis of modern types of spreaders (elevators) for working with the mucoperiosteal flap with an assessment of their design features, the presence of advantages and disadvantages in comparison with the model of a new hybrid tool we have proposed in the practice of surgical dentistry - spreader-suction.*

The systematization of data on the design of spreaders and features of aspiration systems helped us in the development of the design of our instrument - a spreader with integrated aspiration, aimed at increasing ergonomics, reducing operational injury and optimizing the conditions of surgical intervention.

Keywords: *elevator-suction; hybrid surgical instrument; surgical dentistry; mucoperiosteal flap; aspiration system; periosteal elevator; dental implantology.*

Introduction Manipulation of the mucoperiosteal flap is one of the most important stages of surgical interventions in dentistry and maxillofacial surgery. The degree of visualization of the surgical field, atraumatization and ergonomics is determined mainly by this stage of surgery. The main tool used to separate the mucoperiosteal flap from the bone surface is the periosteal elevators (spreaders). Clinicians have developed a large number of different types of elevator, with different designs of the working part, sizes, bending angle and shape of the handle. Most of them were developed by well-known surgeons and became widespread among medical practitioners. Despite the variety of designs and the use of existing tools, there is a problem of maximum performance without traumatic detachment and a full-fledged review of the surgical field [1]. The elevators presented in practice can be classified according to several basic features. (Fig. 1) According to the structure of the working part, spade-shaped, pointed, rounded and curved elevators are distinguished. In terms of the number of working ends, they can be one-way or two-way. According to their intended purpose, there are universal elevators, instruments for delicate detachment of the periosteum, elevators for working with dense tissues, as well as instruments used in extensive maxillofacial surgical interventions. The Molt Periosteal Elevator tool (Fig. 1.1) gained great popularity. This spreader is a two-sided tool, one of its working parts has a wide and flat shape, and the other is narrow and pointed. Due to this, this tool can be used both for the initial step of detachment of the mucoperiosteal flap after an incision of the mucous membrane, and for further opening of the surgical access. The advantages of this tool include its versatility, the

convenience of dosing pressure by a surgeon and great effectiveness in most maxillofacial surgical interventions. [2].

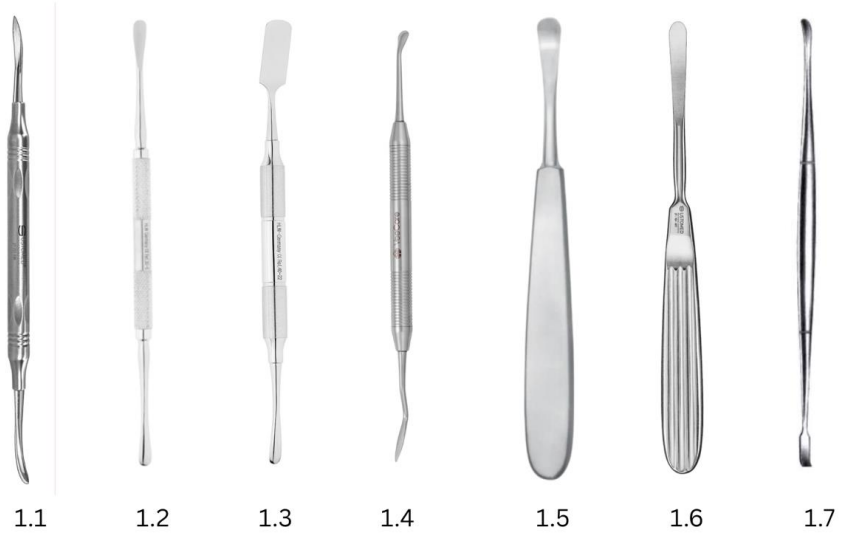
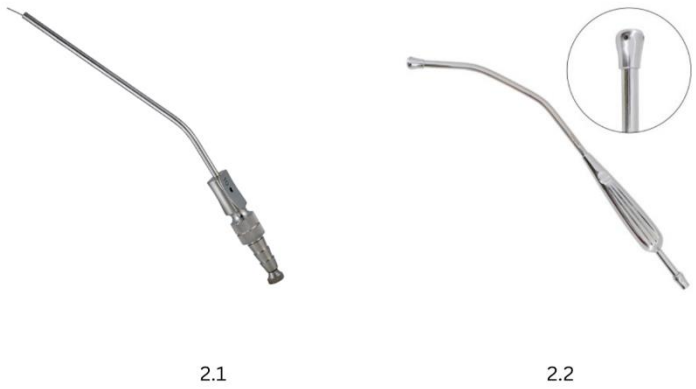


Fig. 1

The other most widely recognized tool is the Freer Periosteal Elevator (Fig. 1.2). This elevator has a thin working part and a moderate bending of its ends, which provides high accuracy and delicacy of manipulations. This elevator is widely used in operations that require gentle and gentle detachment of tissues, as well as when the operating space is limited. The main advantage of this tool is the maximum atraumatism of soft tissues. Also, its use may not be effective enough in working with a tightly attached periost [2,4]. Prichard Periosteal Elevator is also widely used in surgery (Fig. 1.3). This elevator has a wide shovel-like working part designed to separate more rigid tissues and form large mucoperiosteal flaps. Due to its design features, it works as a lever and is perfectly effective when working with a tight attachment of the periosteum to the underlying bone. However, this tool should be used very carefully when working with thin tissues in complex areas, so if not carefully used, this spreader can lead to increased damage to soft tissues [3]. For more delicate precise work, surgeons prefer to use the Woodson Periosteal Elevator (Fig. 1.4). It has a thin working part with small rounded ends. This tool is used mainly for periodontal procedures and operations in aesthetic areas where high accuracy of work and minimal risk of tissue damage are important. Its main advantage is the accuracy and precision of manipulations, but the tool cannot be used with a dense periosteum [4]. Seldin Periosteal Elevator is also one of the instruments used in dental surgery (Fig. 1.5). This tool has a thin working part with a slight bend and is used for neat detachment of the mucoperiosteal flap. Thanks to this design, the surgeon can easily control movements and perform delicate tissue manipulation during tooth removal or implantological interventions. The positive aspects of this tool include the ergonomics and accuracy of the detachment performed, however, as in the aforementioned type of spreader, its effectiveness in rigid tissues is slightly limited [2]. In maxillofacial surgery, Obwegeser Periosteal Elevator is also used (Fig. 1.6). This tool is widely used in extensive surgical operations due to its long and wide working part. Its main advantage is the ability to work deep in the operating wound. However, for normal manipulations in oral surgery, this tool is too rough. A separate group of this toolkit includes the elevators used in work in hard-to-reach areas of the wound surface - this is the Howarth Periosteal Elevator (Fig. 1.7). This elevator has a long narrow working part and a slight bend, all this allows it to be used with limited access. It is applied in most surgical disciplines. It

is also convenient to work with accurate tissue detachment. At the same time, its versatility in standard dental interventions is limited [4].In addition to high-quality ergonomic elevator, surgical manipulations require an aspiration system and an aspiration tip that meet the requirements of the surgeon [2].

Ensuring the removal of blood, saliva and irrigation solutions from the surgical field, aspiration systems play an important role in surgical dentistry, which allows maintaining good visibility of the surgical field, reduces the risk of infection and increases the efficiency of surgical interventions. Aspiration systems are classified according to several characteristics: aspiration power, tip design, manufacturing material and degree of sterility. Distinguish between high-volume and low-volume aspiration systems by aspiration power. High-volume aspirators are used mainly for surgical operations, such as tooth removal, osteotomy, implantation and other operations. They provide removal of a large amount of fluid, blood and irrigation solution during manipulations [2]. Low-volume aspirators (Saliva ejectors) are used mainly for therapeutic dental procedures and are designed to remove saliva and a small amount of fluid [2]. By design, aspiration tips are divided into several types, among which Frazier suction tip and Yankauer suction tip are widespread. Frazier suction tip (Fig. 2.1) is a thin metal aspiration tip of small diameter, designed for accurate aspiration in limited areas of the surgical field.



2.1 2.2

Fig. 2

The design of the tool is a long narrow tube with a small hole at the end and an additional ventilation hole on the handle. This opening serves the surgeon to regulate the force of aspiration by closing or opening it with a finger. Thanks to its design, the Frazier tip has found wide application in microsurgical interventions, including oral and maxillofacial surgery, neurosurgery and otorhinolaryngology. It provides accurate removal of blood and fluid without damaging surrounding tissues [5]. Yankauer suction tip (Fig. 2.2) has a wider aspiration tip with a curved shape and a rounded end. It usually has several lateral openings, which prevents damage to soft tissues during aspiration. This tip is used to remove a large volume of fluid, blood and irrigation solutions from the operating field. In dental and maxillofacial surgery, the Yankauer tip is used when rapid and effective aspiration is required, that is, for extensive surgical procedures, [2,5]. Tips in the aspiration system are divided into metal and plastic. Metal tips are usually made of stainless steel, they are characterized by high mechanical strength, durability and resistance to sterilization. They are used predominantly in surgical procedures. Plastic tips are more often used in everyday dental practice. Aspiration tips can be either disposable or reusable, and are used primarily to remove saliva or a small amount of fluid.

Materials and methods Based on the above types of auxiliary instruments for performing surgery in the oral cavity, it should be noted that the simultaneous use of several types of instruments in the same operating field significantly reduces the visual view of the surgeon and constrains him in carrying out various manipulations. In view of this, we have a need to create a hybrid toolkit that allows us to level the above disadvantages. Such a hybrid tool is a tool that combines the functions of a tip for aspiration and a elevator of soft tissues - Elevator-suction (patent FAP 2021 0140 UZ.). This surgical accessory is a tool necessary for the simultaneous suction of various fluids in the oral cavity (blood, saliva, etc.), since it is a tubular structure, and the soft tissues of the oral cavity are moved away from the surgical field due to the curved tubular part of the "scapula" attached to the end of it, which allows the operating dentist to work in a "dry" surgical field and not injure the soft tissues with other mechanically rotating instruments (boron, cutter, etc.), which the doctor uses together with the suction spreader (Figure 3). The model itself is connected through a hose, which is put on the shank of the model to the suction device, which creates negative pressure.

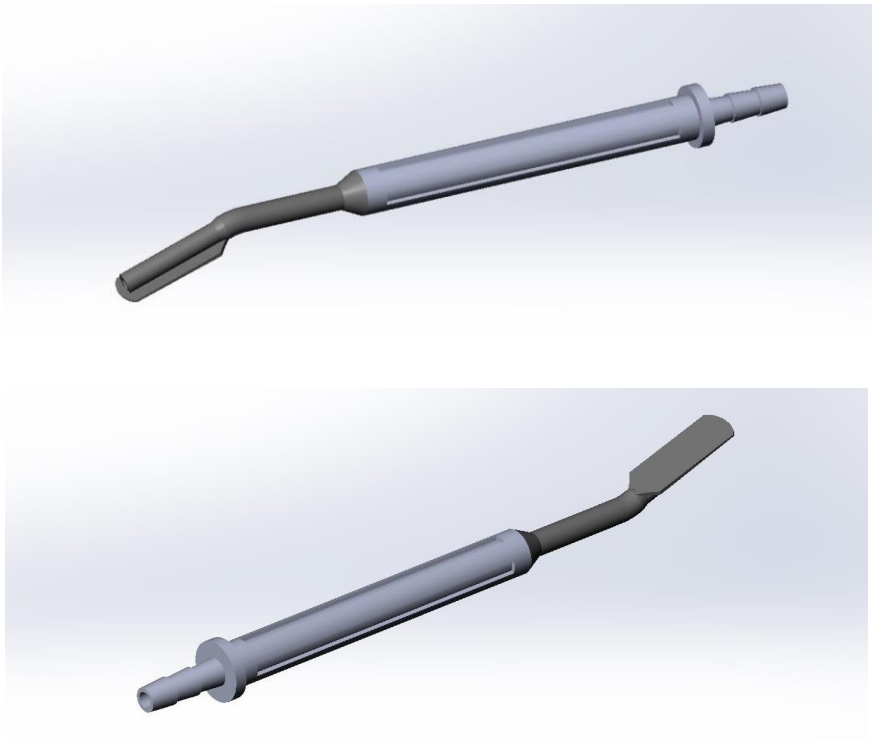


Fig.3

One of the functions of the elevator-suction tool is to retract, which means the first part of the name of the tool. The working part in the form of a spreader is used to separate the mucoperiosteal flap from the bone base and hold it (Fig.) The working part in the form of a small diameter tube connected to the working part-retractor performs an exclusively aspiration function, i.e., the ability to absorb, conduct through itself and remove various types of liquids from various cavities of the human body. The task of using this useful model is to retract, i.e., to hold a soft-tissue flap or soft-tissue structures in the operating field and simultaneously aspirate (aspirate) biological or other fluids entering the operating field, as well as to preserve soft-tissue structures from damage by rotary instruments (turbine, mechanical tips) under liquid irrigation and create good visualization when conducting various manipulations that require "dry" "spaces. (Fig. 4)

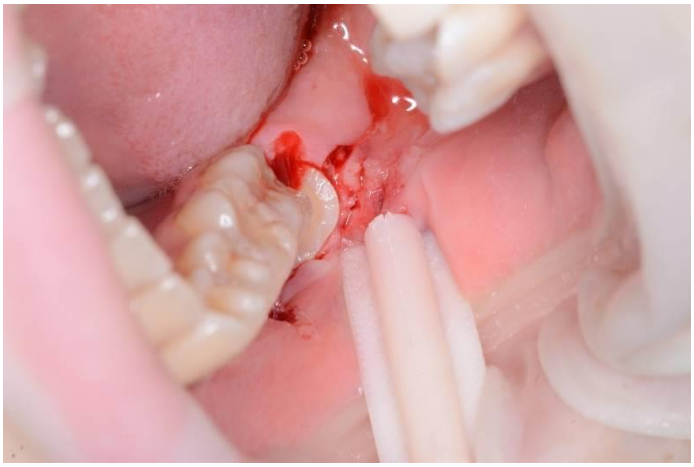


Fig.4

The introduction of this tool in dental practice made it possible to facilitate the manipulation of the dentist in the oral cavity, reduced the number of instruments in the oral cavity, created improved visualization of the procedure, and reduced the risk of soft tissue injuries with rotary instruments.

Results The introduction of this type of instrumentation into our dental practice has created a number of advantages in the work of a dental surgeon:

Firstly, the ergonomics of the instrument contributed to better control of surgical manipulation by the surgeon, eliminating the need for the presence of medical personnel responsible for aspiration in the surgical field

Second, the use of a tool combining the functions of two tools reduced the number of simultaneously applied tools in the operating field, which improved visualization.

Finally, the simplicity and cheapness of the design made it possible to produce a budget version of the plastic tool, which requires a standard 3D printer for manufacturing (printing).

Conclusions Thus, the introduction of this new type of instrument does not diminish the significance of the above types of elevators and aspiration tips, but adds more opportunities to facilitate and accelerate the work of a dental surgeon when manipulating soft and hard tissues in the oral cavity.

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