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RESEARCH ARTICLE

ENDOSCOPY IN ORAL AND MAXILLOFACIAL SURGERY

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ABSTRACT

Endoscopic surgery or keyhole surgery is a minimally invasive medical procedure in which endoscope is used, and it has obtained wide acceptance and popularity in several surgical fields and has improved the standard of surgery.Endoscope is described as an ''extra set of eyes,'' and is the tool for innovations across multiple surgical fields and fabrication of a new instruments and surgical techniques. Various maxillofacial surgeries like TMJ disorders, jaw pathologies, trauma and facial aesthetic surgeries can be diagnosed and treated with lesser rate of complications using endoscopic techniques. This article presents a general review of use of endoscopy in maxillofacial surgery.

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INTRODUCTION

There has been major advancements in endoscopic surgery since Takagi first used in 1918[1]. Endoscopy generally means looking into a hollow cavity or organ for medical problems using an endoscope designed to do. Endoscopic surgical procedures are completed with less morbidity and greater margin of safety[2,3]. Maxillofacial surgeries need advancements in the magnification and illumination of the operative field due to delicate anatomical structures with limited access to the operative field[4]. Minimally invasive surgery should be enforced for lesser operative trauma for the patient than a time consuming invasive procedure. Endoscopic procedures may be more or less costly. The operative period is longer; however, hospitalization period is smaller. Endoscpy produces lesser pain and scar formation and decreases the rate of postsurgical complications. This article reviews the present use of endoscopic techniques for the treatment of various maxillofacial surgical procedures.

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APPLICATION OF ENDOSCOPY IN ORAL AND MAXILLOFACIAL SURGERY

Maxillofacial Trauma: Standard technique for access to middle and upper thirds of the face for facial fracture repair and reconstructive surgery has involved a combination of variousincisions (coronal, lower eyelid, buccal sulcus, vestibularand preauricular incisions[5,6]. These incisions however applied properly, still leaves complication including a scar, facial nerve palsy, eyelid entropion or ectropion[7].The endoscopic surgery was rapidly developed to midface and facelifts. Advantages are aesthetic area of the incisions, smaller scars, improved haemostasis and increased visualization. Repair of craniomaxillofacial trauma can be a challenge[8]. Access can be difficult, and endoscopic procedure can improve the surgeon's view. Endoscope is a useful technology which have provided new ways in management of patients.

ENDOSCOPY IN ORBITALFRATURE

Use of endoscope to repair zygomatic fractures was reported by Kobayashi *et al*[8] in 1995, which provoked interest in using endoscopy to treat facial fractures in trauma patients. The transantral endoscopic technique is indicated in isolated orbital floor blowout fractures or in orbital floor fractures in

association with medial orbital wall fractures or simple zygomatic fractures. The use of the endoscope in orbital fractures have been refined since the 1970s[9]. With endoscope, a minimally invasive procedure can be done to evaluate the extent and severity of the fracture from a transantral approach. The location and size of the defect can be easily identified without invading the orbit[10]. With increased visualization accurate decision can be made regarding the necessary approach and reconstruction to repair the fracture[1.] Through lower lid incision it is difficult to dissect and obtain visibility[5]. Thus endoscopy is used for primary repair of the medial orbital wall fractures and correction of post-traumatic enophthalmos due to previously inadequate reconstruction[6.] Various range of instrumentation is necessary for endoscopic orbital surgery. Video setup is identical as in other endoscopic methods, with a video monitor, a high-quality light source, endoscopic camera, a videocassette recorder, and printer. Recently the endoscopic technique has evolved for repair of orbital medial wall and floor and optic nerve decompression and to reduce fracture accurately and place implants and protect vital structures.

TRANSANTRAL ORBITAL FRACTURE REPAIR TECHNIQUE

Approaches for repair of orbital floor fractures, includes the periorbital approach, transantral approach, or a combination of the two.[10,11]. Transantral approach can be effective for the repair of the orbital blow-out fracture.Not only endoscope is used for diagnosis of orbital fracture but it is also used to release the entrapped periorbital tissue from a trap door type of fracture[12]. Maxillary vestibular incision is used. Osteotomy in the anterior antral wall is done. The endoscope is placed in the sinus. A 30, 4-mm-diameter endoscope with a xenon light source is preferred; A 0, 45, or 70 endoscope can also be used. Sinusotomy is completed, bone fragments are removed, and the margins of the fractures are located. Reduced fractured segments can be stabilized with titanium mesh or any other material. The orbital contents are reduced, and implants are placed onto the orbital side of the fracture. The implant placed is tested for stability with a forced duction test and ocular pulse test.

ENDOSCOPY IN MANDIBULAR CONDYLEFRACTURE

The endoscope is used for the management of condylar fracture with the advantages of ORIF technique, but without major disadvantages like external scar, facial nerve injury)[13]. Mandibular condylar fractures are common and closed reduction is most widely employed for the treatment of dislocated condylar fractures. Temporomandibular joint function post closed reduction depends on the functional adaptation of the altered condylar morphology as the proper anatomic reduction is not achieved by closed reduction. The risk of facial nerve damage and scars can be reduced by endoscopic techniques[14]. Endoscopic-assisted repair does have some disadvantages. The endoscopic reduction and fixation of subcondylar fracture can be done by submandibular approach and transoral approach. A endoscope 4 mm in diameter with a 300 angle was used by an extraoral approach (submandibular approach with transbuccal incisions) endoscope is used successfully for the drilling and inserting of screws[15] .The monitor and endoscopic equipment should be placed facing the surgeon.

The light source and the camera should be close which allows free movement of the instruments without limitations[16]. Special curved retractors, reduction-manipulation forceps are used and placement of clamp at the angle of the mandible for control of the distal segment are done for enhancing the technique .The number of plates used for fixation can vary.

ENDOSCOPY IN MANDIBULAR ANGLE FRACTURE: Mandibular angle fracture is the most common injuries of the maxillofacial region. Several factors contribute to high complications. Using an intraoral approach, it may be difficult for fixation because of limited visibility[17]. With the endoscope, mandible can be fixed with a superior and inferior border plate with a higher degree of precision. With the aid of the endoscope, anatomic reduction by visualization of the entire fracture line is easy

ARTHROSCOPY OF TEMPOROMANDIBULAR JOINT: TMJ arthroscopy is performed on the TMJ by applying a camera to visualize within the circumference of joint. Arthroscopy is a technique for direct visual inspection of internal joint structures, including biopsy and other surgical procedures[18]. In 1918, Tagaki first described arthroscopy of the knee joint using cystoscope. Onishi, in 1970, was the first to report arthroscopy of the human TMJ. Arthroscopy has been derived from to words arthros which means joint and scopien, which means to view hence arthroscopy means looking into a joint cavity. It is diagnostic and therapeutic tool[19.] The instrumentation involved in arthroscopy are 2-3 stainless steel cannulas of 1.9 to 2.7 mm in outside diameter ,Blunt trochars, Arthroscope ,Irrigation system ,Ringers lactate solution or normal saline ,probes, knives, alligator forceps, mechanical shavers, arthrotomes, cautery tips, or laser tips[20,21].

USE OF ENDOSCOPIC - ASSISTED SURGERY IN IMPLANT SURGERY: Micro-endoscopy has been introduced in dental implant procedures. Implant placement has progressed from blind drilling and insertion to computerized guided surgery (stereolithographic stents). Dental Implant Endoscope comes with an optical system of 10,000-pixel resolution and wide field lens (120°), a monitor and a camera[20.] The endoscopic-assisted dental implants placement increase the stability by proper placement into bone of adequate density. Anatomical structures, like inferior alveolar nerve, maxillary sinus, are avoided and preserved using endoscope guided surgery .The number of reports on the application of endoscopy in dental implantology has been very minimal[22]. Endoscopic guided implant placement resulted in minimal invasive surgery, low intraoperative trauma, good implant stability upon placement, few postoperative symptoms, and high success rates after years of loading.

ENDOSCOPY INORTHOGNATHIC SURGERY

The endoscope has been used in various orthognathic procedures to gain better visualization which can minimize complications. Visualizing the inferior border or medial cut using endoscope during a sagittal split osteotomy may prevent an improper split.Unfavourable fractures during sagittal split osteotomy occurs due to deficient medial cut[23]. Unfavourable fracture anterior to the lingula leaves the inferior alveolar nerve in the proximal segment. A poorly oriented medial osteotomy causes fracture of the coronoid process. An insufficient inferior border osteotomy leads to a buccal cortical plate fracture[24.]

Kim and McCain reported the use of an endoscope during mandibular orthognathic surgery. After dissecting medially and visualizing the lingula with the endoscope, with appropriate anatomic cues soft-tissue protection and proper angulation of the medial cut can be placed[2.] Endoscopically assisted vertical ramus osteotomies have been explained via modified Risdon approach and intraoral incisions. In intraoral incisions visualization is improved with the endoscope, medial aspect of the ramus can be explored, neurovascular structures are protected which improves the accuracy of the osteotomy. With 30, 70 endoscopes, pterygomaxillary junction, ptyergoid plates, nasal septum, can be visualized. A 0 scope can be used to visualize the posterior maxillary wall[24].

ENDOSCOPE IN SINUS SURGERY

Indications for Functional endoscopic sinus surgery (FESS) are acute and chronic fungal rhinosinusitis, nasal polyposis and sinus mucocoeles. Nasal preparation is done by injecting LA with epinephrine into the lateral wall of the nose at the superior aspect of the uncinate process. FESS is done by exposing the uncinate process by medializing the middle turbinate. Enlargement of the bone can then be donein an anterio-inferior direction[25]. The maxillary sinus cavity can then be examined with a 30 or 70 telescope and any pathology is removed if necessary. The sinus cavity is then irrigated. This completes the FESS procedure[26].

Conclusion

Endoscopically assisted surgery has been reported as the treatment for various maxillofacial fractures. Endoscopically assisted procedures limits the incisions and have increased intraoperative control, exposure and visibility. Decreased complication rates, increased success rates and efficiency makes the endoscope a successful instrument.

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