Upper cervical region is an area that is the subject of resinous concerns because of its special anatomical structure and the vital structures localized there. While the anterior interventions in this region are difficult even with open surgery, performing this with minimal invasive techniques involves even greater difficulties.

Anterior Approach to the Odontoid Process

a) Transoral-transpharyngeal approach

As a matter of fact, this procedure is a minimal invasive one itself. It is performed using a special retractor and microscope. (Figure 1)

Transoral-transpalatopharyngeal approach is widely used for interventions on the lower clivus, foramen magnum and upper cervical spine. For the approach to pathologies with anterior location in the cervicomedullary junction, the anatomically shortest way is the transoral way. This way, it is possible to have access to the extradural pathologies from the mid-clivus to the C3 vertebral body. (Figure 2) This is the most direct approach to the pathologies compressing the brain stem and the upper cervical chord. Decompression of the non-reducible pathologies in the cervicomedullary region can be ensured best with this method. In the standard transoral microsurgical intervention, low mortality and morbidity rates are ensured with an operational microscope,
high-speed drill, special intraoral retractors, flexible endotracheal tube, intraoperative fluoroscopy and chord monitoring.

Oral bacterial contamination, requirement of nasogastric feeding in the preoperative period sometimes, long periods of intubation and sometimes the phonation problems when incision is made on the soft palate are included in the disadvantages of the transoral transpharyngeal approach.

b) Endoscopy-assisted Transoral Approach

There are authors who have included endoscopy in the standard transoral intervention. They had obtained a wider view angle by using an angled endoscope to assist in transoral intervention, and reported that this increased safety and allowed the operation without any incision in the soft palate and without excising the hard palate.

c) Endoscopic Endonasal Approach

Abuzayed et al. examined the endoscopic anatomy of the region on cadavers, and emphasized that dens resection was possible with pure endoscopic endonasal approach, and this method was more minimally invasive as compared to the classical transoral approach. Dehdashti et al. used this approach in 12 clivus chordoma cases. This method is effective in tumors with central localization and the most frequent complication has been the CSF fluid.

There have been authors that had used transnasal-transclival endoscopic approach for the decompression of basilar invagination. Wu et al. have emphasized that this method prevented adverse conditions including long-term intubation in the postoperative period, lingual edema and swelling, and palatal incision and is less invasive as compared to transoral intervention.

This approach gained popularity after the successful use of endoscopic approach in the pituitary fossa. Kassam et al. in 2005 first used this method. Wu et al. made some modifications in the method and used nasal speculum, made a linear incision on the pharyngeal mucosa instead of using a flap, and entered through one nostril. Magrini et al. used the same method in Down syndrome.

d) Anterolateral Retropharyngeal – Transcervical Approach

The anterolateral retropharyngeal approach to the odontoid process has advantages like not retracting the tongue, low risk of infection, and intubation for long periods of time not being required in the postoperative period. However, complications including the paralysis of the hypoglossal and superior laryngeal nerves related to over-retraction of these nerves are frequent in this procedure.

Fong et al. reported that the procedure is less invasive when the access was made from underneath

Figure 2: Views of the anterior procedure in the upper cervical region. Transcervical (A), transoral (B) and transnasal (C); with the courtesy of Wu et al.
the hypoglossal and superior laryngeal nerves and tubular retractors were used. The authors have stated that this method is satisfactory for access to C1 and C2 pathologies and there will be no need for transoral procedures.

Furthermore, when placement of an implant or bone graft is necessary, transoral approach is inadequate and very narrow. In this case, the anterolateral retropharyngeal approach will be more accurate.

Hsu et al. used image-guided endoscopic transcervical approach for basilar invagination and clival chordoma.

**Odontoid Screw Fixation**

Anterior odontoid screw fixation is a procedure that is possible with the use of only one or scopes and used only in the type II odontoid fractures. For this procedure, and incision is made on C5-6 level to place a Kirschner wire on the C2 body on the midline in the C2-3 disc level and then in the odontoid process and later to place a cannulated screw.

Percutaneous application of this method is possible. Chi et al. presented a series of 10 cases that they applied percutaneous odontoid screw surgery. Hashizume et al. however, presented a modification of this procedure by using a tubular retractor with the help of endoscopy. Kazan et al. developed the telescopic tube system again for the percutaneous odontoid screw surgery. A series of five cases was published by Sucu et al. for the first time in 2008. The forty-two case series reported by Wang et al. in 2011 followed this. In this series, 19 patients that screws placed percutaneously were compared to 23 cases that screws were placed with the open technique. Wang et al. have reported that percutaneous odontoid screw surgery caused shorter times of operation and less bleeding.

**Epilog**

In summary, anterior approach to the upper cervical spine and particularly the resection of dens can be performed less invasively by both transoral and transnasal procedures assisted by endoscopy. Again, it has been reported that odontoid screw surgery can be performed with percutaneous or endoscopy-assisted procedures.

**References**


