Intracranial Migration of K-wire in a Bilateral Cleft Lip and Palate Patient

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ABSTRACT

Management of protruded premaxillary segment in bilateral cleft lip and palate cases is a challenge to clinicians, due to various factors, like collapsed lateral alveolar segments and disrupted muscular ring. It is in practice that, the protruding premaxilla is pinned to vomer using a K-wire. The wire is generally removed after 6 to 8 weeks.

A 16-year-old female patient with bilateral cleft lip and palate reported for orthodontic treatment. Upon routine investigations, presence of a K-wire that was fixed when patient was around 6 months old, and now had migrated intracranially was made. As K-wire is notorious for its migration to distant places and, that any further impending migration, may in future present a serious problem, the wire was removed after necessary precautions. This case report should be an eye opener and post a caution to general, medical, surgical practitioners and orthodontists.

Keywords: Protruding premaxilla-bilateral cleft lip and palate, K-wire fixation and migration, Premaxilla, CCCP, K-wire.

INTRODUCTION

Various techniques with varying results for managing the protruded premaxillary segment have been suggested in literature so far. One such technique is to use a K-wire to pin and fix the premaxilla to vomer. The wire is generally removed after 6 to 8 weeks. We report a case where the K-wire used for such fixation of premaxilla left unremoved, had migrated intracranially.

CASE REPORT

A 16-year-old girl with bilateral cleft of lip and palate reported to department of orthodontics and dentofacial orthopedics, seeking correction of her irregular teeth and improvement of facial appearance. Apart from frequent episodes of intractable headaches, the patient had good general health. Postsurgical history revealed that the patient had undergone surgery for closure of bilateral cleft lip and palate elsewhere when she was around 6 months old. Clinical examination revealed a severely retruded midface suggestive of a Class III skeletal malrelationship due to hypoplastic maxilla. When routine orthodontic diagnostic radiographs, like orthopantomogram, cephalogram (Fig. 1) and occlusal view radiographs were taken, an accidental finding of a K-wire present in right maxilla lying paramedial and diagonally across maxilla from premaxillary region to base of skull was made. The inner end was at the intracranial level suspected of having pierced the duramater. An impacted dilacerated left upper central incisor was also seen. A computed tomography (CT) scan done showed that the wire had entered the suprasellar region abutting on to the anterior cranial process and tuberculum sella (Fig. 2). Intraoral examination done earlier had not revealed any abnormality of mucosal surface or texture suggestive of a chronic irritation along maxillary region.

It was planned to remove the K-wire before orthodontic treatment and also since the wire is known to migrate to distant places and that any further cranial migration may present a grave situation. Opinion was sought from neurosurgeons, plastic surgeons and oral maxillofacial surgeons. Surgery was done by oral and maxillofacial surgeons in the presence of plastic surgeons, neurosurgeons and orthodontists. Under GA, mucoperiosteal flap was raised. The bulge of dilacerated impacted incisor was seen and the tooth was unearthed. The wire was found buried within the bone beneath the dilacerated tooth, requiring removal of the malformed dilacerated tooth. Bone around the wire tip was removed slowly, until the wire could be clamped. The wire offered resistance to external pull and seemed impacted inside bone. With further manipulation, the wire was slowly removed out while being monitored for any bleeding or complication.

The removed wire measured totally 7.3 cm in length with 2 mm of its outer end turned at right angle (Figs 3
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and 4). The wound was closed with 3-0 vicryl. No bleeding or other complications were encountered. Postoperative CT scan revealed no abnormality. The patient was under observation for a day before discharge. The patient is presently undergoing presurgical orthodontic treatment.

REVIEW OF LITERATURE

Varying opinions exist regarding etiology of protrusion of the premaxillary segment in bilateral cleft lip and palate conditions. Premaxillary protrusion is said to be due to excessive stimulation of premaxillary-vomerine suture, absence of muscular sling of upper lip, pressure of lower lip situated behind developing alveolar process exerting distensive force on premaxillary vomerine suture and uncontrolled downward forward growth of cartilaginous septum due to absence of restriction by nasolabial muscle.

Methods that have been suggested for managing the protruded premaxilla include: application of external pressure over premaxilla by means of lip-head appliance, positioning the premaxilla by surgical resectioning of vomer, repositioning of premaxillary segment with intraoral traction, surgical excision of premaxilla, Kirschner wire inserted through cheek behind maxilla at the maxillary pterygoid area and traction applied using Y-shaped Dacron strip slings stretching from the K-wire to a Dacron mesh on the premaxillary segment. Acrylic screw device stapled to palatal shelves which expanded the lateral segments along with traction of premaxillary segment has also been tried.

A cleft lip when repaired was said to provide controlling effect over protruding premaxilla and was referred to as ‘lip adhesion’. Equal rectangular flaps from cleft margins were closed in three layers. Closure of bilateral clefts one side at time was followed. This method had the possibility of offering increased tension across suture while second side was later repaired. Surgical set back of premaxilla with removal of a 4 to 5 mm of vomer bone posterior to vomer-prevomer suture followed by sliding the premaxilla posteriorly, was also practiced. Burstone and Kernahan freed the septal cartilage from bone expecting lesser disturbance in septal growth. They used a K-wire through premaxilla and vomer and drove the wire into posterior portion of vomer. Kahn and Winster suggested additional pins into vomer and lateral palate. Georgiade and Lantham developed a pinned coaxial screw appliance which along with expanding the lateral segments retracted the premaxillary segment. The
screw incorporated acrylic plates of appliance was stapled to palatal shelves. This appliance was later objected for its tendency to cut through bone.

Kirschner wire was introduced by Martin Kirschner in the year 1909 and, since then, has been in wide use for long bones. K-wire was used by Burstone and Kernahan in 1961 for setback of protruding premaxilla and selectively used in cleft case in late 80s.15 Though the popularity has reduced, it is still in practice in few centers.15 Disadvantages of K-wire reported include: infections, breakage of wire while installation and migration to distant places.

Reports about migration of K-wire used for long bones include: intrasplenic migration from hip,16 intrasplenic migration from shoulder,17 cardiac migration,18 migration to cardiac region causing heart embolization,19 cardiac arrhythmia,20 cardiac tamponade and mimicking acute coronary syndrome,2122 migration from shoulder,23 migration from right sternoclavicular joint to heart,24 intrasplinal migration from clavicle.25

Adequate literature regarding migration of K-wire used for cleft patients has not been reported in orthodontic journals. The first claimed report was in year 2000 in cleft palate craniofacial journal, where migration of K-wire used for fixing protruded premaxilla was reported by Aycan et al.26

DISCUSSION

Protruding premaxilla in bilateral cleft lip and palate conditions always are challenging situations. Collapsed lateral palatal shelves, lack of orbicularis oris muscle circle and traction of septomaxillary ligaments contribute to the difficulty in aligning and refixing the protruding premaxilla.1

K-wire sporadically used now for fixing premaxilla is generally removed after few weeks. In this case, the wire had been left unremoved for reasons unknown. Tendency of K-wire to migrate is known. Similar to the reported incidence, in our patient, the K-wire had migrated intracranially into jugum sphenoid. Unlike a previous report by Aycan et al,26 where K-wire had been used for fixing premaxilla and the patient was completely asymptomatic, our patient had complaints of frequent headache, which disappeared after removal of the wire.

It has been suggested by Regal JP et al that bending the outer end sufficiently prevents migration of the wire.25 This belief has been proved futile in our case, as the migration had taken place in spite of the suggested bend. Abnormalities in size, shape, number and eruption state of teeth are a common finding in cleft alveolar region.27 Insertion of the wire through premaxilla harbouring tooth germs could have contributed to malformation of the central incisor which was not in proximity to cleft region as reported by Berkowitz.9

CONCLUSION

Innovations and new techniques of surgical methods take science ahead. It is but the test of time that they need to prove to be upheld further on. Attempts at repositioning the protruded premaxilla in bilateral cleft cases has always been an enigma to clinicians. Number of modalities were practiced and abandoned in the past. Techniques practiced now are waiting to be proved beyond doubts. The reported case will hopefully post a caution to practitioners regarding importance of knowledge on behavior of K-wire, and the need to stress documenting and checking reach of postsurgical instructions about removal of the K-wire within stipulated time.

With improving primary healthcare, increased awareness, improved healthcare reach to distant and remote places, parents of new born cleft babies are now seeking medical care without delay. Encouraging results are now being reported about nasoalveolar molding and presurgical orthopedics in infants.28 Nasoalveolar molding being an early and noninvasive intervention that gives acceptable results without hampering growth potential will probably make a main stay procedure in initial management of cleft lip and palate in future.

REFERENCES

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