Minimally invasive vertical tooth extraction

BACKGROUND

Alveolar bone is lost with tooth extraction because of both physiological factors and iatrogenic mechanisms. This loss can compromise the ability to achieve a functional and esthetic rehabilitation with removable or fixed prostheses or with implants. Factors associated with alveolar bone loss include the patient's general health and behavior, local factors such as tooth type and location, preoperative socket condition, tooth-related factors (number, proximity, and type of tooth extracted), and treatment protocols after the extraction. Mode of extraction can also influence alveolar bone resorption. Conventional tooth extraction techniques include the use of elevators, luxators, peritomes, and forceps and will traumatize the alveolar bone. A mucoperiosteal flap technique, followed by bone removal to facilitate tooth extraction, can be done to manage teeth that conventional instruments can't handle. Bone removal during flap surgery can also add to alveolar bone loss. These factors make the use of more minimally invasive methods that preserve ridge contours highly desirable. Novel vertical tooth extraction techniques have been introduced that cause no direct trauma to the socket walls through severance of the periodontal ligament by pulling the tooth axially from the tooth socket (Figure 1). The performance of the vertical extraction system in anterior teeth and premolar extractions was compared to extractions using conventional techniques. The need for flap surgery was also compared between the 2 approaches.

METHODS

A prospective observational clinical study was done using the vertical extraction system and conventional tooth extractions. The conventional techniques included the use of forceps, luxators, elevators, or peritomes for tooth extraction. Flap surgery consisted of reflection of a mucoperiosteal flap with or without bone removal with a bur. For the vertical extraction technique, success was defined as completely removing roots using the vertical extraction system. If the system failed, teeth were extracted with the conventional tooth extraction technique or, if needed, flap surgery. The 323 teeth treated using the vertical extraction system underwent extraction from November 2010 through April 2014. The 1719 teeth conventionally managed underwent extraction from February 2015 through February 2016.

RESULTS

The patients in the vertical extraction system cohort included 151 men (mean age 50 years) and 89 women (mean age 50 years). Nearly 70% of the teeth were located in the maxilla and nearly 75% had no root canal fillings. Thirty-three teeth had multiple roots, of which 5 were sectioned before using the vertical extraction system. Forty-three teeth were included after forceps extraction had failed.

Over 85% were successfully extracted using the vertical extraction system. Single-rooted teeth had an 87.2% success rate, and multirooted steeth had a 69.7% success rate. Multirooted tooth extractions were 2.2 times more likely to fail than single-rooted tooth extractions. Having a history of root canal filling carried a 2.1 times greater likelihood of failure. Maxillary lateral incisors had a 73.9% success rate. Of the 47 failures in the vertical extraction cohort, 18 needed flap surgery, for an overall incidence of flap surgery of 5.6% for that cohort.

Conventional tooth extraction was used for 223 anterior teeth, 299 premolars, and 1197 molars. Ninety-four anterior teeth in 78 patients were deemed not suitable for forceps extraction. Nearly 72% of the anterior teeth and premolars were located in the maxilla. Twenty-one required flap surgery, for an incidence of flap surgery of 22%.

DISCUSSION

The vertical extraction system had a high rate of success with anterior teeth and premolars that were unsuitable for forceps extractions. In addition, this method had a low rate of flap surgery compared to the conventional tooth extraction techniques. Tooth-related factors associated with a lower success rate for the vertical extraction system included multirooted teeth and root canal fillings.

Clinical Significance

Although further randomized clinical trials are required to confirm the findings of this study, it appears that a vertical extraction system can functional well for anterior teeth and premolars found to be severely destroyed. The need for flap surgery is reduced when the vertical extraction system is used.

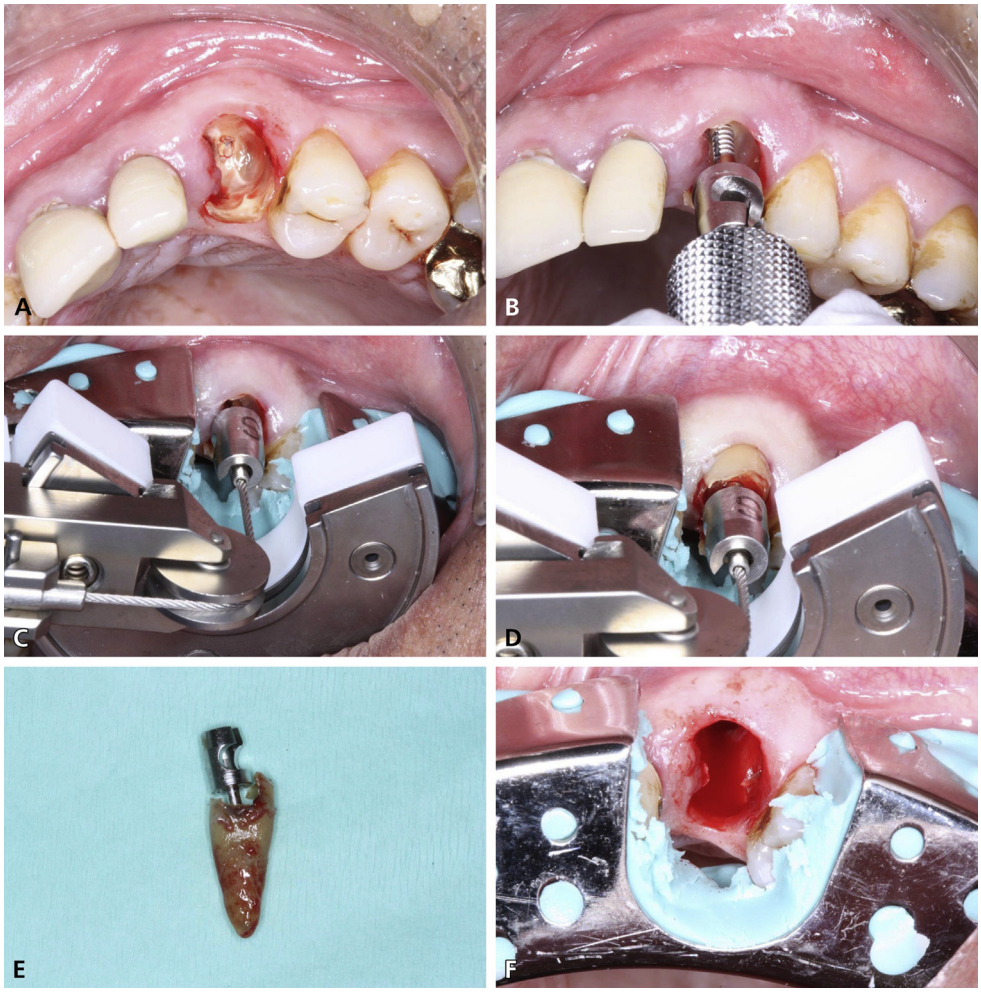

Figure 1. Vertical extraction system (Benex, Helmut Zepf Medizintechnik and Hager & Meisinger) in use during extraction of maxillary left canine tooth. **A,** Maxillary left canine root after gross caries removal and pilot hole preparation into the canal. **B,** Placement of screw into the root. **C,** Support tray and assembled vertical tooth extraction system to achieve axial alignment. **D,** Progressive root extrusion in a vertical direction. **E,** Extracted root. **F,** Tooth socket after extraction. *Figure courtesy of Dr. Dietrich.* (Courtesy of Hong B, Bulsara Y, Gorecki P, et al: Minimally invasive vertical versus conventional tooth extraction: An interrupted time series study. *J Am Dent Assoc* 149:688-695, 2018.)

Hong B, Bulsara Y, Gorecki P, et al: Minimally invasive vertical versus conventional tooth extraction: An interrupted time series study. *J Am Dent Assoc* 149:688-695, 2018

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ORTHODONTICS

Patient satisfaction with Invisalign versus bracket-based orthodontic treatment

BACKGROUND

The quality of health care can be measured by many different variables. One that has become especially important is patient satisfaction. Often patient and professional health care provider satisfaction can differ. A group of adult patients having orthodontic treatment was surveyed for their level of satisfaction and