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Extractions and Alveolar Ridge Preservation: So Easy an Endodontist Can Do It

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Introduction

Teeth referred for endodontic care, which are discovered to be non-restorable (e.g. vertical root fractures or crown to root fractures), typically prompt endodontists to refer to another dentist for the extraction. In both the military and civilian setting, this requires additional appointment time, referrals, increased transit time and missed work for the patient, and a non-productive appointment for the endodontist. From a military prospective, the patient remains a no-go for dental readiness until the tooth is extracted (which can take days to weeks pending availability). Many times, the offending tooth is extracted at a troop clinic or referred via Active-Duty Dental Program (ADDP) and the tooth is removed without alveolar ridge preservation (ARP). ARP is an essential adjunct for potential implant and pontic sites to attenuate the dimensional reduction of the alveolar ridge that normally takes place after tooth extraction (Avila-Ortiz). Army endodontists are in a unique position to spearhead a simple change that will inevitably improve readiness, access to care, and productivity. This subtle change in military endodontics could certainly reverberate to our civilian colleagues.

Individual Critical Task List (ICTL) applies to all Army dental providers, regardless of their specialty. The ICTLs encompass the majority of essential wartime skills needed to ground the dental provider in fundamental dental skills as well as warrior tasks. These skills will form the foundation that will guide the provider to render care in austere environments which will include the diagnosis and management of a broad spectrum of combat related and non-combat related dental emergencies. The fundamental idea that must be ingrained is that all dental providers slotted for an expeditionary operational dental position must not only possess, but be comfortable executing, all the basic skill sets of a 63A listed in the ICTLs to include extractions (Army Dentistry Bulletin). The recommendation can then be made that a properly trained endodontist should be able to transition from the endodontic procedure to a surgical procedure once the tooth is deemed non-restorable. This would improve medical readiness of soldiers, alleviate referrals, allow for more productive appointments and permit Army endodontists to stay current with their ICTLs.

In military dentistry, a range of treatment options are often open to patients and providers without financial interests dictating provider relationships and patient choices. An unlike our civilian counterparts, military readiness at times demands interventio. Army endodontists are in a unique position to best optimize both treatment needs of the patient with Army readiness. The purpose of this investigation is to evaluate Army dental provider's perceptions of endodontists performing extractions both with and without ARP. As well as Army endodontist's views on their own skillsets and willingness to perform a valuable readiness procedure. The null hypothesis is that there is no significant opposition from both Army endodontists and fellow dental providers on Army endodontists performing extractions.

Methods

A link to a web-based survey was emailed to (all active-duty Army dental providers). The email informed members that the survey was for a postgraduate endodontic resident research project and that no personally identifiable information would be requested. Data collection began in August 2021 and ended in October of 2021. The survey instrument included questions regarding participant age, length of experience in dentistry, and dental specialty. To facilitate domain analyses, dental specialties were pooled into four categories: endodontists, general dentists, comprehensive dentists, and other (periodontist, prosthodontist, OMS, etc). Additionally, the survey included questions designed to assess the respondent's willingness and aptitude to extract teeth as well as their views on such procedures being performed by endodontists.
Descriptive statistics are presented to describe the frequency of responses. The normality of data distributions for continuous variables was assessed using the Shapiro-Wilk test. Medians with associated interquartile ranges (IQR) were used to summarize non-normally distributed continuous data (participant age and time to complete the survey). Multiple comparisons were accomplished using the Kruskal-Wallis test with post-hoc comparisons used to elucidate significant results. Chi-square and Mann-Whitney U tests were used for pairwise comparisons. In cases of multiple comparisons, the Bonferroni adjustment was made to the declared alpha level. Significance was declared at $P < 0.05$ for all tests. All data were analyzed by using SPSS version 25.0 (SPSS, Chicago, IL).

Results

A total of 232 individuals initiated surveys via the email link. The median time to complete the survey was 1.5min (IQR 1.1-2.7). The sample included 37 (15.9%) endodontists, 100 (43.1%) general dentists, 46 (19.8%) comprehensive dentists, and 49 (21.1%) dentists in other specialties. A Kruskal-Wallis test revealed significant differences between the ages of different dental specialties in the sample, $P < 0.001$. Post-hoc Mann-Whitney tests were performed and revealed that the general dentists with a median age of 31 years (IQR 29-34) were younger than the endodontists (Median age 37 years; IQR 34-43), comprehensive dentists (Median age 40 years; IQR 34-47), and other dentists (Median age 39 years; IQR 34-46). No differences were observed between the ages of endodontists, comprehensive dentists, and other dentists (all $P > 0.05$).

As expected with aforementioned difference in age, general dentists reported the least experience practicing dentistry with 75% (n = 75) reporting having practiced for four years or less. This is lower than the other specialties, $P < 0.001$. Table 1 shows the frequency and distributions of the reported dental experience of respondents.

Table 1. Respondent Characteristics

	Endodontists		General Dentists		Comp. Dentists		Other Dentists	
	n	%	n	%	n	%	n	%

Time Practicing Dentistry, years								
0 -4	9	24.3	75	75.0	2	4.3	4	8.2
5 - 8	11	29.7	18	18.0	13	28.3	16	32.7
9 - 12	6	16.2	3	3.0	11	23.9	8	16.3
Over 12	11	29.7	4	4.0	20	43.5	21	42.9

Table 2 details, by dental specialty, responses to the survey questions regarding tooth extraction by the provider. Only 78.4% (n = 29) of endodontists indicated that they were comfortable extracting teeth. This was significantly lower compared to the other dental specialties, $P < 0.01$. No difference was found between non-endodontists with over 90% of respondents in all categories reporting being comfortable extracting teeth, $P = 0.17$.

Table 2. Responses by Dental Specialty

	Endodontists		General Dentists		Comp. Dentists		Other Dentists	
Survey Question	n	%	n	%	n	%	n	%
Are you comfortable extracting teeth?								
Yes	29	78.4	94	94.0	46	100.0	45	91.8
Do you routinely extract teeth?								
Yes	4	10.8	77	77.0	31	67.4	26	53.1
Rarely (1 or less a month)	33	89.2	23	23.0	15	32.6	23	46.9
Are you comfortable performing alveolar ridge preservation following extraction?								
Yes	24	64.9	66	66.0	45	97.8	36	73.5
Do you typically perform alveolar ridge preservation when extracting teeth?								
Yes	8	21.6	43	43.0	41	89.1	28	57.1

Similarly, when asked if they routinely extract teeth, endodontists reported the lowest rate ($P < 0.01$) of tooth extractions with only 10.8% (n = 4) indicating that they do so more than once a month. Conversely, 77.0% (n = 77) of general dentists and 67.4% (n = 31) of comprehensive dentists reported that they routinely extract teeth. Although no difference was found between the proportion of general and comprehensive dentists who regularly extract teeth ($P = 0.22$), the rate reported by general dentists was higher the than remaining dental specialties, $P < 0.001$.

Likewise, when asked about one's comfort performing an alveolar ridge preservation and whether they perform such a procedure following tooth extraction, the responses showed clear standouts. Nearly all comprehensive dentists (n = 45; 97.8%) reported that they were comfortable with the procedure and that they typically perform it when appropriate (n = 41;

89.1%). The rates of comfort and performance were significantly higher among comprehensive dentists compared to all other specialties (all $P < 0.01$).

Although numerically, endodontists had the lowest rate of providers who were comfortable performing the procedure (n = 24; 64.9%), there was no statistical difference between endodontists and general dentists (n = 66; 66.0%). This is not the case however with the proportion of providers who reported that they typically perform the procedure. Fewer endodontists reported that they typically perform alveolar ridge preservation (n = 8; 21.6%) compared to all other specialties (all $P < 0.001$).

Finally, when asked if Army endodontists had the skill set to extract teeth with or without grafting, the majority of respondents (n=186; 83.8%) indicated yes. In response to the question "Should Army endodontists extract teeth and perform alveolar ridge preservations when indicated", again the majority of respondents (n = 164; 71.1%) endorsed having Endodontists perform the procedure. Lastly, regarding the question of whether or not Army Endodontists should be more willing to do extractions, again the majority of respondents indicated "yes" (n = 164; 70.7%). Data revealed no differences in the responses to these three questions with respect to the respondent's' own dental specialty or length of experience practicing dentistry (all $P > 0.05$).

Discussion

This study's initial concept stemmed from a five month CDA appointment search (from August-Nov 2020) at Rohde Dental Clinic (endodontic specialty training clinic) which yielded 30 patients who presented for non-surgical root canal therapy or non-surgical retreatment to have their teeth deemed non-restorable early on in the appointment. Generally speaking, fractures extending down the canals/root or severe resorption have led the endodontic residents to recommend extraction at the soldier's home clinic or via ADDP. This would inevitably leave the soldier in dental readiness class 3 (historically non-deployable) until the tooth was extracted. Over the previous five months, those 30 patients typically had to wait on average three weeks to have their extraction completed. Disregarding 2nd molars, of the 20 teeth that were extracted, only five received a bone graft with resorbable or non-resorbable membranes for future implant sites.

Historically, endodontists would strictly do non-surgical root canals, retreatments and apical surgery. The restorative aspect of the treatment was left to general dentists and prosthodontists. As the specialty of endodontics has evolved, so to have preconceive notions concerning who handles certain treatment needs. It is generally accepted now by most in the dental field that endodontist are better equipped to handle the coronal endodontics (post and cores) following root canal therapy (Maslamani). Likewise, in the past, extractions were mostly referred to dentists and oral surgeons. As periodontists became the go-to specialist for implant placement then they too began accepting referrals from endodontists and other providers for extractions (MacBeth).

Like periodontists, endodontists certainly understand root morphology and have a surgical expertise cultivated over two years of post-graduate training. Endodontists also have a knowledge and proficiency to manipulate and place grafting materials (von Arx). This can

certainly be explained with our findings of 78% of endodontists acknowledging proficiency at extractions with and without ARP. Yet, why do we see that only 10% of endodontists extract teeth on a routine basis in an Army setting? At the Rohde Dental Clinic, each endodontic resident saw at least one non-restorable tooth a month on average. Thus the question should be reframed to fellow endodontists in the Army; rather than referring these hopeless teeth to a colleague let's put our training to good use. An extraction with ARP makes the appointment productive to the provider, patient and the Army. It solves a readiness issue and keeps the endodontist up to date on ICTL guidelines. This truly is a win win scenario. The results of this study support to a hypothesis of no differential perception associated with military specific endodontists and tooth extractions. Simply put, on average, endodontists believe they can do these procedures and so do our colleagues.

Conclusion

Results showed that 78.4% (n = 29) of endodontists indicated that they were comfortable extracting teeth. However, when asked if they routinely extract teeth, endodontists reported the lowest rate ($P < 0.01$) of tooth extractions, with only 10.8% (n = 4) indicating that they do so more than once a month. Likewise, the majority of respondents (n = 164; 71.1%) endorsed having endodontists complete extractions with or without ridge preservation. The results of this study indicate that Army endodontists should be more willing to include extractions, with or without ridge preservation, into their clinical practice.

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