Anterior Dental Extractions among Dinka and Nuer Refugees in the United States: A Case Series

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Introduction

Ethnomedicine focuses on the idea that even "exotic-appearing health beliefs and behaviors" can be understood if they are examined within the cultural context where they have been developed. In a different cultural setting, many health-related practices become meaningless or even detrimental to health status. Traditional dental practices of refugees of Sudan's Nuer and Dinka tribes, resettling in the United States, provide an illustration of "...cultures in violent collision," demonstrating that practices which are healthful in one culture may not be so in another. In this case series, we discuss the experiences of five Sudanese refugees, aged 25 to 34, who had six mandibular anterior teeth removed during childhood. Although the modified dentition was not problematic while in Sudan, it represented a prominent toothless condition in the United States. As a result, after relocation, the refugees requested and received restorations with dental implants of the anterior teeth.

Adult Nuer and Dinka refugees from the Sudan, many of whom were missing up to six mandibular anterior teeth, have been resettled in the U.S. for nearly a decade. In Sudan, as in much of Sub-Saharan Africa, extracting incisors (and sometimes canines) occurs just after eruption of permanent dentition. The practice is associated with achieving adulthood, beauty and tribal identity, and is necessary for emitting specific linguistic sounds and consuming softer food textures. This ancient practice in Sub-Saharan Africa is at least 1,500 years old and may have originated when tetanus incidence rates were high and fluid ingestion through locked jaws was crucial. Those populations that once extracted teeth and those that continue to extract two to six mandibular or maxillary anterior teeth (such as the Dinka and Nuer people) live near Africa's Nile River or in the Nile valley, or are pastoralists whose lives center around cattle. Historically, at least nine such cultures from Southern Sudan removed anterior teeth during some or all of their recent history, and this practice has become inextricably linked to tribal identity. In Western cultures, however, tooth loss has been associated with lower standards of health, socioeconomic achievement, education, attractiveness and ability. Consequently, refugees who arrive in the U.S. missing their anterior teeth, particularly young adults aged 17 to 45 years, face a different set of cultural standards and health factors that prompt a desire to restore their dentition.

Although no references were found in the literature concerning the extraction of healthy teeth among refugees to the U.S. from Bosnia, Vietnam, Russia or...
Iraq, examining culture-specific practices can serve as models for similar conditions in other low-income American populations.

Case Series

In 2001, the staff from the Office of Minority Health within Nebraska's Health and Human Services system requested a health survey among a newly arriving, little-known Sudanese refugee population. The University of Nebraska's Department of Anthropology convened 10 focus groups over 12 months to construct a culture-specific health instrument.

Before the formal survey process began, it was clear that many refugees from at least three Sudanese ethnic groups—Nuer, Dinka, and Maban—who had undergone ritual anterior dental extractions in childhood, wanted their dentition restored. Also, during all focus group discussions, Nuer and Dinka refugees asked about dental care and education regarding nutrition in the U.S. Thus, our work began with unsolicited requests from the refugee community.

Dental Restoration

We approached the University of Nebraska Medical Center's (UNMC) College of Dentistry (COD) to perform the restorations, knowing that the replacement work would provide a much-needed teaching and research opportunity for dental students. In addition, the UNMC COD, as a teaching institution, could provide lower charges for a refugee population, among which more than 60 percent lived at or below the 2004 U.S. poverty level and just 38 percent had dental insurance.

We offered assistance to two men of the Dinka tribe, and one man and two women of the Nuer tribe because each was missing at least six mandibular anterior teeth (see Figures 1-2) and were young (ages 24 to 35) (see Table 1 on the following page). All were born and lived part of their lives in Southern Sudan, and had teeth extracted as part of a traditional practice near the time of permanent eruption. All participants from the Dinka tribe were missing the mandibular incisors and canines (Figure 1); the Nuer refugees also were missing the maxillary canines (Figure 2). Anthropologists collected patient and cultural data, and transported and monitored refugees pre- and post-treatment.

Two of the five subjects reported that they, like many in the Sudanese community, had used removable partial dentures. Both subjects reported dissatisfaction with the removable partial prostheses (RPD) because they did not provide adequate confidence or oral function; the Sudanese were embarrassed to wear them because the dentures did not stay in place, and they could not eat desired foods. The treatment teams and refugees preferred fixed restorations secured with dental implants because the stability could improve function, and successful osseointegration would result in less alveolar bone loss over time as compared to continued edentulism. Consequently, each refugee was provided, free of charge, a fixed prosthesis attached to three titanium implants. All dental materials and staff time were provided through the support of Nobel Biocare USA, Inc. (Yorba Linda, Calif.) and Dental Designs Laboratory, Inc. (Lincoln, Neb.), and the faculty and staff of the UNMC COD.

All subjects had the initial surgical placement of the mandibular anterior implants (Stage I) in October 2002. Once placed, the implants were left submerged for four to six months to allow for osseointegration. All of the implants were exposed through a second surgical procedure (Stage II), and healing abutments were placed on the implants. A series of appointments were then required to fabricate the fixed restorations. All surgical and restorative procedures proceeded without incident. Because neither Medicaid nor private insurance reimburses for implants, which are considered elective, and the cost of the definitive restoration was more than $6,000 per person, we were unable to assist more refugees.

Quality of Life Factors

To maximize the results of the dental restorations, which were costly in both resources and time, we examined other areas related to the effect of anterior dentition for these refugees, including cultural factors, incisal ability, current dietary habits, language-related issues, social concerns and dental hygiene.

Food Acquisition Ability

Before and after restoration with dental implants, we assessed how the lack of incisors and canines might affect the eating ability of these patients using a six-item bite index adapted from Leake (see Table 2 on the following page). The foods used in the index were selected because of their prevalence in the U.S. diet and use in social settings like restaurants and community events. The items—apple, beef jerky, carrot, celery, roast beef and spinach leaves—covered a range of textures and posed a
Table 1. Participants in the Pre- and Post-Restoration Nutrition Study.

<table>
<thead>
<tr>
<th>Refugee ID</th>
<th>Sex</th>
<th>Approx Age</th>
<th>Tribe</th>
<th>Extractions*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Male</td>
<td>24</td>
<td>Dinka</td>
<td>1+2: C</td>
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</tr>
<tr>
<td>B</td>
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<td>Nuer</td>
<td>1+2: C, C</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>Female</td>
<td>30</td>
<td>Nuer</td>
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<td>8</td>
</tr>
<tr>
<td>D</td>
<td>Male</td>
<td>23</td>
<td>Dinka</td>
<td>1+2: C, C</td>
<td>6</td>
</tr>
<tr>
<td>E</td>
<td>Male</td>
<td>35</td>
<td>Nuer</td>
<td>1+2: C, C</td>
<td>8</td>
</tr>
</tbody>
</table>

*Mandibular incisors = 1; Mandibular canines = C; Maxillary canines = C;

Table 2. Pre-Restoration Processing Ability among Refugee Participants

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Apple</th>
<th>Beef Jerky</th>
<th>Carrot</th>
<th>Celery</th>
<th>Roast Beef</th>
<th>Spinach Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refugee ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>4</td>
<td>4, 7</td>
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<td>4</td>
</tr>
<tr>
<td>B</td>
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<td>4, 7</td>
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<td>4, 8</td>
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</tr>
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<td>9, 4</td>
<td>6</td>
<td>4, 6</td>
<td>4, 6</td>
<td>6, 8</td>
</tr>
<tr>
<td>D</td>
<td>1, 3</td>
<td>9, 4</td>
<td>6</td>
<td>4</td>
<td>4, 5</td>
<td>4</td>
</tr>
<tr>
<td>E</td>
<td>1, 2</td>
<td>4, 7</td>
<td>6</td>
<td>4, 7</td>
<td>4, 6</td>
<td>4, 9</td>
</tr>
</tbody>
</table>

1=pierced w/ upper incisors; 2=pulled head back; 3=rolled apple toward left premolar & took bite; 4=placed in side of mouth; 5=pierced with premolar & top canine; 6=bit only with premolar, canine missing; 7=twisted head away from hand; 8=separated food by pulling with hand; 9=tore into small pieces; 10=unable to bite or process with teeth

variety of difficulties for people without anterior teeth. Each participant was presented with each food item and asked to demonstrate how they would eat it, if it was served raw. Before restoration of the extracted mandibular teeth, participants generally were unable to use the remaining maxillary incisors to nip or pierce a piece of carrot, celery or roast beef in preparation for mastication (Table 2). All participants but one used the outermost edges of the maxillary lateral incisors to perforate an apple; however, the upper incisors were not used by any of the participants to incise any other food type or texture. To chew most of the food items, participants began by placing the food at the side of the mouth for incising (Table 2). When eating fibrous foods such as apples, beef jerky and celery, the participants held the food in place with the pre-molars and/or molars but moved the head to the side or back, or tore the food by hand, to obtain bite-sized portions. Meat, such as roast beef, could be entirely separated by the molars and premolars if the texture was tender. Still, the meat had to be placed at the side of the mouth in order to acquire a chewing piece.

Food Recognition, Consumption and Preparation

All participants then were asked to indicate whether they had ever eaten the particular food and, if so, to describe how the item would be ingested (i.e., cut, cooked or eaten in raw form). Whether or not they knew the English word for each food item, all participants recognized each of the six foods used in the index and had eaten them at least once. Only three items—carrots, spinach and jerky—had ever been consumed raw by any of the participants; specifically, two of the five participants had eaten these items uncooked. By contrast, most of the items in the food index were either cut or cooked prior to ingestion. The only food that participants did not cook before eating was an apple, and this fruit was not consumed regularly. Spinach and beef jerky were seldom cut but instead were torn into small pieces by hand before eating.

Food, Fluid and Snack Intake

Another item of interest concerned current dietary patterns, including consumption of all liquids and snacks. Participants were asked how often they ate, when they ate, and what each “meal” included. They also were asked about the amount and type of fluid consumed and what food was included in their daily diet that was not part of a meal, such as a snack food. Four of the five subjects noted that rice was the most common item in their U.S. diet, while three consumed stewed beef during a typical meal. Bread was regularly consumed by two subjects as well.

Overall, the subjects appeared to eat twice rather than three times daily as is common in the U.S. All five participants indicated that they now drank milk daily, and both juice and soda weekly. Alcohol was never consumed. None of the respondents ate common U.S. snack foods daily, such as candy, chocolate or crackers, with the exception of fruit (primarily bananas and oranges). However, candy, chocolate and crackers were eaten by three of the five participants weekly.

Social and Emotional Concerns

A series of in-depth interviews was conducted to explore social concerns related to the absence of the lower anterior teeth. Participants were asked if they felt that the missing teeth affected sound production of American English and whether they avoided any behaviors, such as talking or smiling, because the teeth were absent.

Participants reported that some English sounds were difficult to make
without their anterior teeth, such as “h,” “th,” “v” and “s.” Two said they avoided speaking because they could not enunciate English words in the same way that most native English speakers did. Post-restoration, however, the refugees reported a change in their confidence and ability to produce sounds in English.

Also, before the implant placement, all participants noted that they limited or altered their smile, rarely smiled or placed their hand over the mouth as they smiled, due to the embarrassment associated with missing anterior teeth.

After all implant restorations were in place, all participants reported greater comfort in public settings. As one refugee noted, “I look like the people here, and they look like me.” Another expressed a new ease for eating in public places such as restaurants. All participants indicated that they smiled more often and noted a change in self-image, from a positive general attitude to feeling “very good” about their appearance.

Current Dental Hygiene Practices

Participants were asked to discuss their oral hygiene habits as practiced before restorative treatment. All participants indicated that they performed dental hygiene on a daily basis and used U.S. dental products. For example, all but one participant used a toothpick to clean his/her teeth after a meal. Also, all reported using toothpaste and toothbrushes after arriving in the United States, despite the fact that Western hygiene products were not used in Sudan or in refugee camps as they were neither available nor affordable. Although all participants reported that they once used cow dung ash to create a paste for cleaning their teeth in Africa, none continued this practice in the U.S. Before dental implant placement, none of the participants had been educated about dental floss and had never used it before they received oral hygiene training at the UNMC COD. Yet, once the dental implants were in place, and they had completed dental visits, all participants reported the use of dental floss from one to three times per day. Only one participant indicated that he still used cleaning sticks from the ‘toothbrush’ tree (i.e., twigs from Salvadora persica and related species) as he would have in Sudan and/or in the refugee camp.

Discussion

All of the Sudanese refugees were missing at least six lower anterior teeth and had been without these teeth for at least 15 years before they were restored with implants. Thus, they had not used 12 anterior teeth for all of their adult lives.

The inability to use the anterior teeth for incising may result in premature wear of the premolars and molars. This wear may not have been a problem in Sudan, where traditional diets include liquids such as milk and well-cooked or stewed foods, but in the U.S., there is no doubt that a compromised posterior dentition can have a detrimental effect on one’s health.

Healthy posterior teeth generally allow for a broader food selection. A compromised anterior dentition also impacts food selection. Pre-treatment, refugees who chose to eat a food represented in the index, or other foods of a tough or fibrous texture, were forced to make noticeable head movements and/or increase preparation time before chewing. For some participants, noticeable head movement and the associated embarrassment limited or prevented altogether the consumption of the foods in the index.

Refugees reported that their diets and/or food preparation techniques had not changed after implant restoration; they ate the same foods and used the same preparation techniques. One participant continued the same food selection and preparation because a spouse was still without anterior teeth and could not easily eat raw or tough foods. The rest of the refugees stated that they were unfamiliar with typical American foods, hence rice and stewed beef remained staples in their diets. However, a change in eating behaviors after the restorations of the anterior teeth may not have been anticipated. People do not necessarily alter dietary patterns once oral health status has improved. Education is required to alter established food selection habits among U.S. dental patients.

With the lack of anterior teeth, refugees from the Nuer and Dinka tribes were unable to incise most U.S. food types or textures. Once the implants had restored the dentition, all participants were able to incise food as if they had a natural dentition. This was significant for the refugees to be able to eat common food in the U.S., in public settings and with American colleagues and friends, without needing to use noticeable head movements or extensive food preparation. The inability to use the anterior teeth for incising may result in premature wear of the premolars and molars. This wear may not have been a problem in Sudan, where traditional diets include liquids such as milk and well-cooked or stewed foods, but in the U.S., there is no doubt that a compromised posterior dentition can have a detrimental effect on one’s health.

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therefore, assistance—including nutrition-related training—will be required if the refugees are being exposed to U.S. foods for the first time. Sudanese women prepare food and men never cook. In the United States, many male refugees lived alone and had to procure or cook food without assistance from women, but they typically had not received any education about foods eaten in the U.S. or how to prepare them. It was unclear if numbers of meals and food consumed by these five patients were representative of the Sudanese refugee population as a whole. To generalize our observation would require expanded data collection methods, including food diaries, observations of food intake and long-term data collection.

The most notable dietary change for these Sudanese refugees was the inclusion of refined sugar in both fluids and snacks. In Sudan, refugees rarely eat foods or products that have sugar added. By contrast, in the U.S., it is hard to avoid sugar in many available foods as the average American consumes 64-plus pounds of sugar per year. The negative impact on dental health of sugary foods, drinks and snacks would be similar to that seen in the dental health of U.S. children.

To determine whether tooth replacement improved sound production of English words would also require a larger sample size to determine which sounds could not be made by native speakers of Nuer or Dinka and which might be related to post-dental restoration. Specifically, was a particular phoneme or sound present in the indigenous language, such that there was actual experience forming the sound, or did the missing anterior teeth alone actually account for the sounds produced and the noted changes? Historically, the Dinka extracted teeth to produce a "hissing" sound, but such a sound is not valued in Americans with missing teeth. All study participants indicated that they smiled more often and reported a change in self-image, ranging from a more positive general attitude to feeling "very good." The adults in this case series were young (25 to 34 years old), and this age range appeared to be a common demographic description for Sudanese refugees in Nebraska. Refugees from war-torn Sudan have a strong desire to succeed because they cannot return home in the near future. Annual dental check-ups will be essential to maintain their dental health, especially given that all subjects reported higher rates of sugar consumption in the U.S. for themselves and their children. Also, they no longer had access to traditional hygiene materials, such as chewing sticks that are known to reduce bacteria and remove plaque. Refugees rarely received a dental health screening upon arriving in the U.S., and annual dental visits were not generally reported by the Sudanese refugee population. Given that the refugees are currently among the low-income families that generally experience more caries, have more untreated oral disease and experience greater tooth loss, we can expect that the Sudanese refugees will not have a healthy dental status without intervention. The ability to replace extracted or missing teeth appears to be an important solution for improving the overall health status of refugees.

Conclusion

Many adult refugees from Nuer and Dinka tribes in Sudan face a difficult transition in the United States because they do not have functional anterior teeth, a visible trait that appears to be necessary for incising a typical American diet with ease and creating a positive self-image. The inability to eat, speak and look like other Americans, coupled with lack of dental hygiene training and the inclusion of refined sugar in the diet, may have a deleterious effect on overall health status. Studies have demonstrated the importance of having front teeth for health status and self-image. This study contributes to an understanding about the impact of traditional dental extractions on individuals who move to another culture where the anterior teeth are important socially and functionally.

Acknowledgments

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and materials. Finally, we thank the UCARE undergraduate research program at the University of Nebraska Lincoln for providing funds for data collection and manuscript preparation. We hope that this case series report, as well as future research efforts, will contribute to the provision of resources related to refugee dental care and an appreciation for the importance of the anterior teeth to maintaining and/or achieving a high health status among other low income populations in the U.S.

References


