critical because younger individuals, specifically, those less than 10 to 15 years of age, have an inherently increased risk of cancer induction related to radiation exposure because of their increased cellular growth rate and continued organ development. In addition, they have a higher risk because there is a longer life expectancy, which allows a longer latency period before cancer is expressed. Age ceases to be a significant factor between ages 10 and 15 years.

EXPLAINING RISK TO PATIENTS

Patients should be given an idea of the risk that is involved in any imaging, which includes CBCT. To do this, it's helpful if the dentist can give them something that will compare the dose from CBCT with other activities with which they are familiar (Figure 5). This will help to put the risk information into a context that will help them make an informed choice.

Aanenson JW, Till JE, Grogan HA: Understanding and communicating radiation dose and risk from cone beam computed tomography in dentistry. *J Prosthet Dent* 120:353-360, 2018

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IMPLANTS

Flap versus flapless surgery

BACKGROUND

Implants provide an excellent choice for edentulous or partially edentulous patients, with a high rate of success. However, the best technique to use in providing these implants remains to be identified. The 2 choices are flap surgery, where a flap is elevated to provide a better view of the implant site and reduce complications, and flapless surgery, where no flap is done. Both have their advantages and disadvantages, and many clinical trials have been undertaken to identify which is the best approach. A meta-analysis of the available literature was done to assess the risks of failure and marginal bone loss associated with dental implants prepared using the flap or flapless procedure.

METHODS

The literature search included the PubMed, Web of Knowledge, and Cochrane Library databases. It extended over the past 10 years and was supplemented by a hand search of the reference lists of the retrieved articles. Thirty-one studies were selected for analysis.

RESULTS

Nine of the studies were retrospective and 22 prospective. They covered a total of 1681 patients who had 4138 implants. Patients ranged in age from 16 to 89 years. Follow-up was 12 months in 28 studies and 3 months in 3 studies. Seven studies focused on single-tooth implants, whereas the remainder covered implants for edentulous or partially edentulous jaws.

The healing strategies of the studies included submerged or nonsubmerged protocols. In addition, 8 studies loaded implants within 2 weeks of placement in both flapless and flap groups, 13 used a delayed loading protocol, and 6 involved both immediate or early loading and delayed loading.

Nineteen hundred seventy implants were placed using the flapless procedure. Sixty-three of these implants failed. Flap procedures were used for 2168 implants, of which 39 failed. Eleven studies reported no failures. The differences in terms of implant failure did not differ significantly between flap and flapless procedures. Five studies showed a statistically significant difference between the 2 procedures with respect to marginal bone loss.

In the meta-analysis, failure rate of the implants was statistically altered by the insertion technique employed. Implants placed with the flapless procedure had an increased risk of implant

Clinical Significance

Dentists must consider the advantages and disadvantages of providing implants using a flap or a flapless procedure. It's imperative to carefully assess the quantity and morphology of bone using imaging preoperatively. This will help to ensure that sufficient bone remains. The computer-guided implantation system may also provide real-time imaging that can ensure the correct position and angulation of the dental drill are achieved, thus avoiding the risk to critical anatomical structures. Flapless procedures offer healthier peri-implant soft tissues and better vascularity of the peri-implant mucosa, which leads to better resistance to inflammation and bacterial invasion. They are also associated with less surgical trauma, higher patient satisfaction levels, a shorter operative time, and better postoperative healing.

failure compared to those placed with a flap procedure. Delayed loading did not have any effect on the failure rate of the dental implants regardless of whether the flapless or flap procedure was employed. However, immediate or early loading of dental implants placed using the flapless procedure had a higher failure rate. In addition, marginal bone loss was greater with the flap procedure than with the flapless technique.

DISCUSSION

The flapless procedure was associated with a higher risk for failure. However, this technique offers several advantages, such as less marginal bone loss, compared to the flap technique.

Zhuang J, Zhao D, Wu Y, et al: Evaluation of outcomes of dental implants inserted by flapless or flapped procedure: A meta-analysis. *Implant Dent* 27:588-598, 2018

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ORAL MEDICINE

Bone fragility, periodontal disease, and tooth loss

BACKGROUND

Links between periodontal disease and general health are a topic of interest especially as the population ages. With age, patients can develop fragile bones and are more susceptible to falls and fractures. Osteoporosis, a systemic skeletal disease, is a major problem among older women especially and can cause fragility fractures, increased mortality, and a significant economic burden. Having both osteoporosis and periodontitis increases the risk for fractures. A longitudinal study on the possible role of skeletal bone fragility on periodontal status and tooth loss was undertaken to determine if there are links between these conditions.

METHODS

This longitudinal study focused on 134 elderly women (age 65 to 80 years) who were evaluated for bone mineral density (BMD) at the lumber spine, femoral neck, and total hip. They also underwent fracture risk assessment (FRAX). Both were done after 6 and 10 years. Seventy-one women were analyzed at 6 years and 49 at 10 years. The BMD and FRAX data were used to indicate bone fragility in structural equation modeling. These women also underwent periodontal examination and offered information regarding postmenopausal tooth loss and the use of antiresorptive drugs, such as bisphosphonates, to manage systemic bone conditions. The models were used to estimate these patients' relative risk (RR) and 95% confidence interval (CI) of BMD and FRAX for sites with clinical attachment loss (CAL) of 6 mm or greater and for tooth loss.

RESULTS

At 6 years, bone fragility was a significant predictor for severe CAL, even when the patient was taking antiresorptive medication. Poor bone condition measurements were associated with a higher risk for periodontal sites with CAL $\geq$6 mm and tooth loss. When the BMD of the femoral neck was higher, the risk of CAL $\geq$6 mm and tooth loss was lower. At this point, fewer than 20% of the women studied had begun antiresorptive treatment.

At 10 years, bone fragility remained a significant predictor of higher CAL, but neither bone fragility nor CAL were linked to tooth loss. A higher number of interproximal sites with CAL $\geq$6 mm was associated with the BMD of the femoral neck, total hip, and lumbar spine as well as the FRAX related to major fracture and hip fracture. Having a greater BMD of the total hip was associated with a reduced risk for CAL $\geq$6 mm. The FRAX of the hip was linked to a higher risk for more periodontal sites with CAL $\geq$6 mm. In addition, with a better BMD in the total hip, fewer teeth were lost.

When the cross-sectional analysis was done, bone fragility was not related to either severe CAL or tooth loss in persons taking antiresorptive medication. Those not taking this medication who had fragile bones had a significant risk for severe CAL and a trend toward greater tooth loss. Tooth loss was directly associated with dental attendance, although CAL was not. With better bone conditions, the number of interproximal sites with severe CAL and the number of teeth lost were both lower. Adjusting for antiresorptive medication and periodontal maintenance eliminated the significance of these associations.

More than half of the women with osteoporosis were receiving antiresorptive drugs, and 65.1% of those taking these medications had been doing so for more than 3 years. About 90% of the women took oral bisphosphonates.

Analysis of the receiver operating characteristics (ROC) curve revealed an area under the curve of 0.70; the sensitivity was 71.0% and the specificity was 70.0%. These data indicated that