

CURRENT THERAPY

Dental Extractions in Patients with Acute Nonlymphocytic Leukemia

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Infection continues to be the leading cause of morbidity and mortality in patients with acute nonlymphocytic leukemia (ANLL).^{1,2} It has been established that as many as 24% of such infections arise from oral sites.^{3,4} It is therefore crucial to eliminate oral sources of potential infection in these patients; dental extractions could be one means of achieving this goal. However, guidelines for extraction procedures in patients with ANLL are controversial.

The avoidance of dental extractions in these patients has generally been recommended. For example, Lynch⁵ advises that all extractions are contraindicated in patients with leukemia. Thoma⁶ indicates that surgery in these patients may result in the breakdown of wounds as well as in prolonged and massive bleeding. He warns that extractions should be performed "only if absolutely necessary." Zegarilli and Kutscher⁷ suggest that "oral surgical procedures are usually contraindicated." Little and Falace⁸ agree that patients in the acute states of leukemia should receive "only conservative emergency dental care." However, they feel that surgical procedures may be performed on patients with controlled disease, adequate platelet levels, and in most cases prophylactic antibiotic coverage.

A clinical dilemma therefore exists; the clinician must weigh the risk of infection from the retention of periodontally or pulpally involved teeth against the risk of hemorrhage and infection that could result from removal of the teeth. This study reports on the prevalence of local and systemic complications associated with the extraction of teeth in patients with ANLL. Since the data regarding complications in this study compare favorably with those reported

in nonleukemic patients,⁹ it is concluded that with proper patient evaluation and surgical technique, such patients can and should have indicated teeth extracted.

Materials and Methods

Twenty-eight consecutive patients with ANLL admitted to the Baltimore Cancer Research Center (BCRC) between June 1, 1976, and January 31, 1981, with indications for the extraction of teeth were studied. Indications for extraction included severe periodontal disease and/or evidence of pulpal necrosis with resultant periapical pathology. Each of the following was used as a criterion for severe periodontal disease involving a tooth: a periodontal pocket >6mm apical to the cemento-enamel junction (disclosed by a periodontal probe), or radiographic evidence of dissolution of alveolar bone. Both radiographic and clinical findings were used as criteria for pulpal necrosis and resultant periapical pathologic conditions. Radiographic evidence of dissolution of the lamina dura was used as an indication of a periapical pathologic condition. This observation was evaluated only in conjunction with positive clinical findings, which included sensitivity to percussion and/or lack of response to an electrical pulp tester.

If the platelet count was less than 40,000/mm³, random donor or histocompatibility-matched platelets (as available) were transfused one-half hour before surgery in an attempt to obtain platelet values of 40,000/mm³ or greater at the time of surgery. If the absolute granulocyte count was less than 2,000/mm³ at the time of surgery, a prophylactic antibiotic regimen was used of ticarcillin (75 mg/kg intravenously, one-half hour preoperatively, repeated six hours postoperatively) and amikacin (150 mg/m² intravenously, one-half hour preoperatively, repeated six hours postoperatively). When possible, the extraction was performed ten days before the fall below 500/mm³ of the patient's granulocyte count. This meant that the extraction must have taken place three to four days before the start of chemotherapeutic regimens. If this interval could not be obtained, the extractions were usually delayed until after chemotherapy when the granulocyte count rose to the required level.

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Table 1. Oral Surgical Procedures in Patients with Acute Nonlymphocytic Leukemia

| Patient Status | Admitted for Treatment | |
|----------------------|------------------------|--------------|
| | Granulocytes | Granulocytes |
| Number of patients | 5 | 8 |
| | 22 | 40 |
| Extractions | 22 | 40 |
| Mean/Patient | 4.4 | 5 |
| Surgical extractions | 8 | 2 |
| Alveolotomies | 1 | 9 |
| Complications | 0 | 1 |
| | 7 | 0 |

The surgical technique used in each of these patients appears to have been important both in control of hemorrhage and in prevention of infection. Initially there was some discussion of the propriety of performing alveolotomies in these compromised patients. However, attaining primary closure was believed to be crucial for control of hemorrhage and infection, even if additional surgery was involved. Based on the results of this study, it is our opinion that obtaining primary closure outweighs the risk of leaving the bone intact but leaving a wound open to oral contamination.

Some of these patients were at high risk for developing disseminated intravascular coagulation (DIC). Leukemic patients in general are thought likely to develop this serious coagulopathy when their total white blood cell counts reach 100,000 to 150,000/mm³ and chemotherapy is given. No extractions were performed when it was suspected that DIC was likely to occur within three to four days of the surgery.

While no studies of the effect of chemotherapy on extraction site healing have been reported, the pharmacology of the chemotherapeutic agents used suggests that such healing is likely to be severely compromised. The lack of such studies has hampered the clinician's ability to make sound clinical judgments when weighing the risk of infection secondary to retained diseased teeth against the potential lack of healing and subsequent infection associated with extractions in these patients. The decision not to place materials such as bone wax, oxidized cellulose, and absorbable gelatin sponge in the extraction wounds was based both on our previous experience and on this potential lack of adequate wound healing. Before our study, two patients at this center had extractions performed and packing materials placed; serious systemic infections developed in both. One was successfully treated with systemic antibiotics. The other patient subsequently died of infection, the source of which was apparently the absorbable gelatin sponges placed in

The extraction was as atraumatic as possible, and included the following measures: 1) primary closure with multiple interrupted sutures, 2) alveolotomies as necessary to obtain primary closure, and 3) no placement of packing materials in any extraction site. All patients were followed up postoperatively for evidence of bleeding and/or acute infectious episodes until they either attained remission or died.

Results

Twelve male and 16 female patients with ANLL were studied. The average age was 43.8 years, and the ages ranged from 20 to 82 years.

119 extractions, including 13 surgical and 17 alveolotomies, were performed (Table 1). The procedure in any given patient ranged from one extraction to 24 extractions with four quadrants of alveolotomy. One alveolar osteitis developed in a patient in complete remission (WBC 4300/mm³, platelet count 320,000/mm³). This infection was managed with systemic antibiotics and local irrigation with isotonic saline solution.

The hematologic status of the patients at time of surgery varied (Table 2). All patients with less than 2000 granulocytes/mm³ were given prophylactic antibiotics according to the regimen previously noted. No hemorrhagic complications occurred in any patient; all oozing of blood from extraction sites ceased within 12 hours.

Discussion

In the past it has generally been recommended that teeth not be removed from leukemic patients. This practice has been due to fear of hemorrhagic diathesis, infection, and poor wound healing. The improvement in supportive care in major leukemia treatment centers has minimized the danger of uncontrolled hemorrhage associated with extractions in these patients. However, the management of infection, particularly when wound healing has been impaired, remains difficult. Since the mouth has been identified as a major source of infection in leukemic patients,^{3,4} the removal of pathologically involved teeth could lessen the patient's risk of infection during myelosuppression.

The use of platelet transfusions for thrombocytopenic patients greatly reduced hemorrhage in this study. Random donor platelets as well as HLA-matched platelets, when necessary, were used as indicated. Platelets were given intravenously approximately 30 minutes prior to surgery and were available during surgery. Arrangements were always made for platelets to be available postoperatively, but none were needed in this series of patients.

Table 2. Hematologic Values of Patients with Acute Nonlymphocytic Leukemia at Time of Surgery

| | Patient Status | | |
|-------------------|--------------------|------------------------------------|------------------------------------|
| | Complete Remission | Granulocytes >2000/mm ³ | Granulocytes ≤2000/mm ³ |
| White blood count | | | |
| Mean | 4,640 | 7,300 | 8,500 |
| Range | 3,400-6,500 | 4,100-14,600 | 100-33,900 |
| Granulocytes | | | |
| Mean | 2,350 | 3,600 | 706 |
| Range | 1,000-3,700 | 2,400-5,400 | 0-2,000 |
| Platelets | | | |
| Mean | 230,875 | 165,000 | 117,466 |
| Range | 61,000-442,000 | 48,000-243,000 | 6,000-295,000 |

the extraction sites to control profound bleeding. Alling¹⁰ advises that "gelatin sponges may absorb microorganisms and cause alveolar osteitis, a painful condition that will delay repair." Since hemorrhage was prevented by other means, we felt that the placement of materials in extraction sites was neither required nor indicated for the patients in this study.

Extractions were performed as late as two days after the initiation of chemotherapy. However, this procedure preferably occurs at least three days before the initiation of myelosuppressive chemotherapy. Most chemotherapeutic regimens used at this center require approximately one week before granulocytopenia and thrombocytopenia occur. Thus, this extraction schedule allows for approximately ten days of healing before the patient becomes severely granulocytopenic.

Discussion often occurs how best to treat a patient with dental infection, either pulpal or periodontal, whose leukemic state requires immediate chemotherapy. Extraction of teeth at this time may result in life-threatening infection due to greatly compromised host defenses and inadequate healing. On the other hand, leaving an active dental infection untreated may induce the very infectious complications we hope to avoid. The solution to this dilemma is presently under investigation at this center.

We certainly do not agree with the proposal of Chapman and Crosby¹¹ that all teeth be removed prior to chemotherapy. Rather, we feel that the careful removal of indicated teeth can be accomplished in these patients using the outlined precautions, the adverse affects of the surgery approximating those in nonleukemic patients.

Summary

Dental extractions in patients with leukemia are controversial, since they may lead to hemorrhage, delayed wound healing, and infection. However, the retention of diseased teeth in these patients may also lead to infectious complications during chemo-

therapy. With adequate hematologic values and specific surgical techniques, 119 extractions were performed on 28 patients with acute nonlymphocytic leukemia. No serious adverse sequelae occurred, and the prevalence of other adverse effects was comparable with that in nonleukemic patients. It is concluded that with proper precautions, extractions can be performed on these patients.

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