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CEFOTAXIME PROPHYLAXIS IN MAJOR NON CONTAMINATED HEAD AND NECK SURGERY: ONE-DAY VS. SEVEN-DAY THERAPY

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Summary: Patient who undergo major surgery of head and neck benefit from perioperative antibiotic prophylaxis. This study was developed to determine if seven days of antibiotic administration would be more effective than 1 day therapy. A prospective randomized double blind study was designed. Patients were randomly assigned to receive cefotaxime sodium for either 24 hours or seven days. In each case, the drug was administered intramuscularly, begining 1 to 2 hours preoperatively and continued for the prescribed period. Sixty patients were evaluable. Thirty patients were assigned to one day of perioperative prophylaxis: Wound infection developed in four patients (13%). Thirty patients were assigned to seven days of perioperative antibiotic prophylaxis. Wound infection developed in three (10%) of these patients (P>0.05). These data suggest that no benefical effect from administration of antibiotics for longer than 24 hours postoperatively can be achieved in patients who undergo major head and neck surgery.

Key words: Antibiotic, prophylaxis, head and neck surgery

Considerable controversy surrounds the use of prophylactic antibiotics in major head and neck surgery. There is evidence that the use of antibiotic therapy in head and neck operative procedures will decrease the incidence of infectious complications (9). Wound infection following major head and neck surgical procedures is the leading cause of postoperative morbidity and may eventuate in death (8). Previous studies have indicated that the wound infection rate in patients who undergo head and neck surgery without the benefit of perioperative antibiotics is 28% to 87% (1,15). The optimal antibiotic regimen, however, remains contentious (8). To contribute the clarification of these controversies, in a series of sequential, prospective, randomized, and double blinded trials we compared cefotaxime(1gr) for one day and for seven days in two groups of patients, in the prevention of post operative wound infection following major head and neck surgery.

Material and Method

A protocol to investigate the effects of cefotaxime given for various lengths of time in the prevention of post operative wound infections following head and neck surgery was developed at Erciyes University School of Medicine, ENT Clinic. Patients on antibiotic therapy within four days of surgery were ineligible for entry. Patients who need entry into the upper aerodigestive tract through the neck were excluded from the study. No patient was allergic to penicillin or cephalosporins and none refused to enter the study. The following

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patient variables were recorded upon admission: age, height, weight, sex, drug allergy, associated medical conditions, prior radiation therapy, recent weight loss, lenght of preoperative hospitalization, tumor location, size and evidence of metastases (if there is malignancy). Operative variables included: type of incision, drains, estimated blood loss and replacement, use of cautery.

Cefotaxime sodium was chosen for prophylaxis because of its known effectiveness against aerobic pathogens most commonly isolated from wound infections, anaerobic bacteria and because of its low toxicity.

Patients were randomly assained as two groups and 30 patients were included in each group. Cefotaxime, 1gr was given intramuscularly(im) two hours prior to the planned time of skin incision and continued for either 1 day postoperatively (two doses) or for 7 days postoperatively; cefotaxime sodium 1 gr every 12 hours was used. Closed suction drainage was used in many of the cases.

Wounds were graded daily on a scale of 0 to 4 by either one of the authors.
0 = No erythema or induration
1+ = Erythema up to 1 cm around the wound
2+ = Erythema and induration 1-5 cm around the wound
3+ = Erythema and induration > 5 cm around the wound
4+ = Purulent drainage, either spontaneously, by incision or by needle aspiration

Wounds were considered infected by the demonstration of pus at any time during the post operative hospitalization, aerobic and anaerobic cultures were obtained from the wounds cosidered infected.

The surgical team also graded the viability of skin flap on the following skale
1+ = Normal appearance (blanches on digital pressure)
2+ = Pale (does not blanch)
3+ = Cyanotic
4+ = Necrotic.
Types of the operations are shown in table I

Table I. Types of the operations

Operation type	Group 1 1 day	Group 2 7 days
Total resection of parotid gland and RND	7	3
Total resection of submandibular gland and RND	5	7
Metastatic carcinoma resection on the neck	11	12
Total resection of thyroid glan	7	8
Total	30	30

(RND: Radical neck dissection)

Results

Sixty patients entered the study. There were 37 men and 23 woman, ranging age from 31 to 63 years, averaging 52 years. Of 60 patients, 30 recieved Cefoxime for 1 day; 30 recieved for 7 days. The infection rate was 13%(4/30) and 10%(3/30) respectively, representing a statistically no significant reduction in infection. (P>0.05) Table II.

Table II. Infection rate among 1 day and 7 days group

Groups	Infection (-)	%	(+)	%	Total	%
1 day	26	86.7	4	13.3	30	100
7 day	27	90.0	3	10.0	30	100
Total	53	88.3	7	11.7	60	100

x2=1.446 P>0.05

Erythema, induration, and local skin chances were noted in 68% of the patients. Patients with wounds showing only diffuse erythema and induration (1+,2+, and 3+ wounds) recieved no antibiotic treatement other than the one day and seven days of cefotaxime recieved in the peri and post operative periot. None of these patients progressed to wound suppuration. We believe that erythema and induration represent local tissue reaction to trauma and interruption of the normal venous and lymphatic drainage of the cervical skin flaps.

Wound infection was invariably preceded by a collection of fluid under the skin flap. A wound was graded as 4+, in the presence of purulent discharge. These wounds either drained spontaneously or by incision. Specimens of the purulent drainage obtained from each of the seven patients who developed wound infection were submitted for bacteriologic examination and sensitivity testing. Multiple organisms were identified in five of the seven patients. Aerobic bacteria were present in seven of the wounds (Table III).

Table III. Bacteria identified in the infected wounds

Patient	Bacteria identified
Cefotaxime 1 day	
1	Coagulase positive Staphylococcus, Escherichia coli
2	Pseudomonas aeruginosa
3	Staphylococcus aureus, Proteus miribalis
4	Proteus miribalis, Branhamella catarrhalis, Staphylococcus epidermidis
Cefokaxime 7 day	
1	Pseudomonas aeruginosa,
2	Klebsiella pneumoniae, Hemophilus influenzae, Staphylococcus epidermidis
3	Staphylococcus aureus, Branhamella catarrhalis, -hemolytic streptococcus

Postoperative bronchitis, tracheobronchitis and pneumonia were rarely encountered. Pulmonary infection typically developed seven to fourteen days within the post operative period. No organisms resistant to the tested antibiotics were identified. These systemic infections were treated with appropriate antibiotics. No antibiotic related complications occured. None of the patients developed thrombocytopenia, prolonged prothrombin times, or clinical bleeding.

Discussion

There is evidence that the use of antibiotic therapy in head and neck operative procedures will decrease the incidence of infectious complications (9). The primary goal of prophylactic antibiotics for major head and neck surgery is the prevention of wound infection. Prophylaclic antibiotics for patients who undergo surgery are maximally useful when begun before the surgical contamination (3). The introduction of bacteria 1 hr before and up to 2 hrs after the administration of antibiotics was tested in animals which showed the presence of a critical time period during which the development of bacterial infection may be supressed by antibiotics. This effective periot begins the moment bacteria gain access to the tissue (8). Antibiotics are ineffective when administered three hours or more after bacterial contamination. Antibiotics give maximum supression of infection if administered before bacteria gain access to the tissue. These results have subsequently been corroborated in human studies (5,16).

Previous studies have also demonstrated that 1 day of perioperative antibiotic prophylaxis results in an incidence of postoperative wound infection that is not statistically different from the incidence of infection encountered with antibiotic prophylaxis for more prolonged periods of time (9,14). The efficacy of antibiotics begun preoperatively and continued for one day into the postoperative period has been compared with for four or five days treatment postoperatively (4,9,15). Long term antibiotic administration did not improve the incidence of postoperative wound infection when compared with one day of antibiotic use (8).

In this antrospective randomized study, we showed that prophylactic antibiotic used for one day can be effective when employed in the perioperative period in the prevention of post operative head and neck infections. Four (13%) infections developed in patients undergoing treatement with cefotaxime for one day as compared with three (10%) infections in patients receiving cefotaxime for seven days. The differance in incidance of postoperative wound infection observed in the two treatement groups was not statistically significant.

Retrospective review of large prospective studies demonstrates that the likelihood for development of a wound infection after major head and neck surgery is less than 10% when the patients are treated prophylactically, beginning before surgery and continued for 24 hours postoperatively (8,9,11).

Major wound pathogens reported in most series, including the present one, are S. aereus and gram negative organisms. Most of the major aerobic pathogens and all anaerobes are relatively sensitive to cefotaxime. It has been demonstrated that third generation cephalosporin - such as cefoperazone sodium, moxolactam disodium, cefotaxime sodium, high dose cefazolin, or the combination of gentamicin and clindamicin - may be equally effective in the prevention of postoperative wound infections (10).

Another subject to consider is the cost of these treatement schedules. Needles to say, cost of a treatement with a cephalosporin for seven days costs much more than one day treatement. On the other hand, this differance becomes clearer when compared with the morbidity, work lost, increased hospitalization, and cost of a post operative wound infection (13). The development of a significant post operative wound infection, in our experience, results in an additional 12 days of hospitalization.

These data suggest that no benefical effect is to be gained by administration of antibiotics for more than 24 hours postoperatively. These observations are in keeping with observations made in gynecology (6), urology (7), general surgery (12), and cardiothoracic surgery (2).

We conclude that intraoperative use of cefotaxime for one day is as much effective as seven days treatement in reducing the incidance of postoperative wound infection.

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