THE PROPHYLAXIS OF SUBACUTE BACTERIAL ENDOCARDITIS*

A. CARLTON ERNSTENE, M.D., C. J. McGARVEY, M.D.**
and JEROME A. ECKER, M.D.
Division of Medicine

SUBACUTE bacterial endocarditis consists essentially of a bacterial infection superimposed on previously damaged heart valves or on a congenital cardiac anomaly. The condition formerly was almost invariably fatal but treatment with penicillin and other antibiotic agents now results in the cure of 75 per cent or more of all patients. Certain cases, however, fail to respond, and in others serious or fatal congestive heart failure develops during the course of treatment or within a few weeks after completion of antibiotic therapy. It is important, therefore, that everything possible be done to prevent the occurrence of the disease.

It is known that dental extractions often are followed by transient bacteremia[1] and that in persons with rheumatic valvular disease or congenital cardiac anomalies, this not infrequently results in the development of subacute bacterial endocarditis. There is evidence also that the incidence of bacteremia can be reduced appreciably by the administration of penicillin prior to extractions.[1] Several observers have recommended that all patients who have rheumatic or congenital heart disease and who require dental extraction, tonsillectomy or irrigation of nasal sinuses receive penicillin as a preventive measure against the development of bacterial endocarditis. The present study was undertaken to ascertain what additional situations may be considered indications for the use of antibiotic agents for this purpose.

Material and Results

A series of 111 consecutive cases of subacute bacterial endocarditis was analyzed with particular reference to the type of pre-existing heart disease and to the event that appeared to have afforded entry of the infecting organism into the circulation. Rheumatic valvular disease was present in 100 patients, a congenital cardiac anomaly in 9, and syphilitic aortitis with aortic insufficiency in 2 (table 1). Only 59 of the 100 patients with rheumatic heart disease reported having been aware of the presence of a cardiac abnormality before the onset of bacterial endocarditis. In all of the 9 persons with congenital heart disease, however, the existence of the condition was known.

The portal of entry of the infecting organism and the event which made the portal available could be identified with reasonable certainty in 32 of the 111

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**Formerly on the Assistant Staff. Now practicing in Des Moines, Iowa.*

Table 1

TYPE OF PRE-EXISTING HEART DISEASES IN 111 CONSECUTIVE CASES OF SUBACUTE BACTERIAL ENDOCARDITIS

Type of Heart Disease	Number of Cases
Rheumatic valvular disease	100
Congenital cardiac anomaly	9
Syphilitic aortic insufficiency	2

cases (table 2). In all of these, blood cultures yielded growths of Streptococcus viridans or nonhemolytic streptococci. Dental extractions had been performed within 1 month of the onset of symptoms in 13 patients, the largest single group. The average time between the extractions and the first awareness of symptoms was 12 days. In 9 cases an acute infection of the upper respiratory tract had preceded the appearance of symptoms by an interval of 2 days to 2 months. The infections included acute tonsillitis, acute nasopharyngitis, acute pansinusitis, influenza, and acute bronchitis. In several patients in this group there had been no interval of apparently normal health between the original infection and the onset of symptoms attributable to infective endocarditis.

Two cases of subacute bacterial endocarditis followed criminal abortion, and a third began after spontaneous abortion in the seventh month of pregnancy. In one patient the initial symptoms occurred during the first week after normal delivery at term.

There were 3 cases in which subacute bacterial endocarditis developed after trauma to the skin or scalp with secondary infection. These included one instance of infected laceration of the scalp, one of severe cellulitis of the foot following the removal of a callus from a toe, and one of pyogenic skin infection about the site of a lumbar puncture. In this group, symptoms of systemic infection first became noticeable from 1 to 3 weeks after the trauma.

There was one case in which bilateral purulent otitis media immediately preceded the onset of symptoms.

In one patient the illness began during the second week after tonsillectomy and in another shortly after cholecystectomy.

In addition to the patients in whom the development of bacterial endocarditis could be causally related to some earlier event or infection, there were many whose dental hygiene was poor or who gave a history of chronic bronchitis, chronic sinusitis, or repeated attacks of tonsillitis. These conditions undoubtedly afford portals of entry at times for organisms causing subacute bacterial endocarditis but there was nothing to incriminate them in the clinical histories reviewed in the present study.

Discussion

The insidiousness of the onset of subacute bacterial endocarditis and the fact that bacteria may enter the blood stream through insignificant lesions without producing detectable evidence of local tissue damage make it impossible, in a majority of patients, to identify the route by which the organisms enter the circulation and the exact time at which invasion occurs. The results of the present study confirm the importance of dental extractions as a predisposing cause for the development of the disease. They indicate also that acute infections of the upper respiratory tract, acute otitis media, abortion, labor, and surgical or infected wounds may afford a portal of entry for the invading organisms. This mixed group and the group of dental extractions were responsible for nearly 30 per cent of the cases of subacute bacterial endocarditis analyzed. It seems apparent, therefore, that in individuals who have rheumatic valvular disease, congenital cardiac anomalies or syphilitic aortic insufficiency, dental extractions and the other conditions mentioned are indications for the routine employment of appropriate prophylactic measures. Further studies may identify additional situations in which preventative treatment should be carried out.

Not every person who has rheumatic valvular disease or some other cardiac abnormality which makes him a candidate for subacute bacterial endocarditis develops the disease after dental extractions or one of the other predisposing conditions. Data are not available as to the absolute frequency with which the combination of suitable cardiac soil and a potential avenue for admission of bacteria into the circulation results in the disease. Because of this it will be difficult to ascertain the efficacy of any program of prophylaxis. All that one can do is to suggest procedures which, in the light of our present knowledge, appear to be of promise. It must be emphasized that failure of subacute bacterial endocarditis to develop in a patient who has received preventive treat-

Table 2

PRECIPITATING FACTORS IN 32 CASES OF SUBACUTE BACTERIAL ENDOCARDITIS

Precipitating Factor	Number of Cases
Dental extractions	13
Acute upper respiratory infection	9
Abortion	3
Trauma to skin or scalp with secondary infection	3
Spontaneous labor at term	1
Purulent otitis media	1
Tonsillectomy	1
Cholecystectomy	1

ment cannot be interpreted as proof of the value of the measures employed. On the other hand, the occurrence of the disease in spite of prophylactic therapy immediately indicates a deficiency in management. Instances of this kind will occur, in all probability, and it would be of value if there were a central registry to which they might be reported. The information gathered in this manner would save time in identifying defective schedules and help in establishing more reliable methods of prevention.

Formerly it was our practice to carry out prophylactic therapy, in patients who were to have dental extractions or tonsillectomy, by the intramuscular administration of penicillin in doses of 50,000 units every 2 hours, beginning approximately 1 hour before the procedure and continuing for the subsequent 5 days. More recently procaine penicillin G in water or oil has been employed by intramuscular injection. Three hundred thousand units are given 1 hour before the extractions or tonsillectomy, and daily doses of the same amount are administered thereafter. The same schedule is followed in the presence of acute upper respiratory infections, infected wounds, abortion or childbirth. Treatment is continued for 5 days and for a longer period if fever persists. The recommendation that the minimum period of therapy be 5 days is an arbitrary one, and further experience may demonstrate that shorter courses, as advocated by Rhoads,[2] are adequate. In a series of 18 patients in whom prophylactic treatment has been carried out according to these schedules, there has been no instance in which subacute bacterial endocarditis has occurred. Other antibiotic agents, such as aureomycin and terramycin, may prove to be effective preparations for prevention of the disease.

There is one additional point to be commented upon. In the present series of cases, only 59 of the 100 patients who had rheumatic valvular disease reported knowing of the presence of a cardiac murmur before the onset of subacute bacterial endocarditis. This indicates a need either for a broader program of physical examinations, especially in children and young adults, or for giving patients more specific information about the presence of murmurs due to organic valvular disease. Persons who have congenital cardiac anomalies appear to be aware of their condition more commonly than do individuals who have the less severe grades of rheumatic heart disease. Certainly every patient who has valvular disease or a congenital abnormality of the heart or great vessels should be informed fully of the possible danger of dental extractions and the other conditions which may afford a portal of entry for subacute bacterial endocarditis and should be impressed with the indications for prophylactic antibiotic therapy.

Summary

The portal of entry of the infecting organism and the event which made the portal available were identified with reasonable certainty in 32 of 111 consecutive cases of subacute bacterial endocarditis. In 13 patients, dental extractions had preceded the onset of the illness, and in 9 others, there had been an earlier acute infection of the upper respiratory tract. The disease followed

abortion in 3 instances and began during the first week post partum in 1. Three cases occurred after trauma to the skin or scalp with secondary infection, and in 1 patient bilateral purulent otitis media immediately preceded the onset of symptoms. One case began after tonsillectomy and another after cholecystectomy.

In view of these findings it is recommended that all patients who have valvular heart disease or a congenital cardiac anomaly be given procaine penicillin G in water or oil by intramuscular injection (1) before and for 5 days after dental extractions or tonsillectomy, (2) during acute infections of the upper respiratory tract for a minimum of 5 days and longer if fever persists, (3) before spontaneous or therapeutic abortion and spontaneous or induced labor and for the following 5 days, longer if fever is present, and (4) in the presence of infected wounds for a minimum of 5 days or until all evidence of local infection has cleared. Further studies may identify additional situations in which preventive treatment should be employed. Other antibiotic preparations may also prove to be effective prophylactic agents.

The difficulty of determining the efficacy of a program for preventing bacterial endocarditis has been emphasized. Instances of failure to protect against the disease will point the way to more effective procedures. A central registry to which such cases might be reported would hasten progress.

It is important that patients be informed of the presence of valvular heart disease or a congenital cardiac anomaly and of the indications for prophylactic measures against subacute bacterial endocarditis.

References

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