Autograft Rejection in Acutely Burned Patients: Relation to Colonization by *Streptococcus agalactiae*

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The abrupt emergence of *Streptococcus agalactiae* in a population of acutely burned children is described in relationship to autograft rejection and the use of antibiotics to eradicate the organism from the patients.

In the management of acutely burned patients, colonization of burns by group A streptococci can lead to serious infections and contribute to the loss of autografts. To prevent these problems, penicillin or related antibiotics are routinely given to burn patients on admission to prevent group A streptococci from infecting the patient (6).

The group B streptococcus, *Streptococcus agalactiae*, is also associated with various human clinical problems (2, 3, 5). This report describes a sporadic outbreak of *S. agalactiae*, in an acute pediatric burn unit, which was related to the loss of autografts in some patients. In an adjacent unit, streptococci isolated from patients who had survived acute burns and were admitted for plastic surgery of old burns (reconstructive) were also studied for comparison. Burn wounds and graft sites were cultured a minimum of twice weekly with premoistened cultures (Scientific Products, Houston, Tex.) and were streaked on 5% human blood agar using Columbia and phenyl-ethyl alcohol agar (BBL). The swab was also placed in fluid thioglycollate medium (BBL), and these media were incubated aerobically at 37°C and observed daily for 3 days. Catalase-negative streptococci, resembling gram-positive cocci, were transferred to either brain-heart infusion broth or Streptosel broth (BBL). These cultures were then used to inoculate Mueller-Hinton blood agar for the Kirby-Bauer agar disk diffusion susceptibility test. A Taxo A (BBL) bacitracin disk was added to the antibiotic test agar. Streptococci that produced beta hemolysis and were susceptible to bacitracin (>12 mm) were classified as presumptive group A strains (7). The isolated strains were also inoculated into Enterococcosel broth (BBL) for esculin hydrolysis, and into infusion hippurate broth (Randolph Biologicals, Houston, Tex.). The hippurate test was done on 24-h broth supernatant fluids by the method of Bailey and Scott (1). Streptococci that grew in Enterococcosel broth in 18 h, and in hydrolyzed esculin were considered group D strains. Speciation of the latter group using selected methods and tests of Facklam (4) indicated that 95% of the enterococci were mixtures of *S. faecalis* and its varieties. Serological identification of selected group A and group B strains was performed by the Texas State Health Department, Austin.

Prior to and during the emergence of *S. agalactiae* in the burn unit, enterococci were prevalent in the wounds of acutely burned patients (Fig. 1). The enterococci were found in admission burn cultures of approximately 35% of the acutely burned patients and colonized the burns of the majority of the other patients after admission. Enterococci were regarded as insignificant clinically and had not been associated with autografting problems. The initial recognition of *S. agalactiae* occurred in one patient with an infected and rejected autograft. During the next 3 months, 52 strains of the organism were isolated from 11 of 53 acutely burned patients which included 46 burns and graft sites, 1 intravenous catheter tip, and 5 urine specimens (<10⁴/ml). Six of the 11 patients from whom *S. agalactiae* was isolated experienced rejected autografts containing this organism. During or before this period, no other organism in the burns was associated with autograft rejection, including the sporadic occurrence of group A streptococci in acutely burned patients.

The 52 *S. agalactiae* strains were beta hemo-
lytic, bacitracin-resistant, and did not grow in Enterococcusel broth. All strains hydrolyzed sodium hippurate but a positive test was more pronounced if the ferric benzoate precipitate formation was allowed to develop at 37 C for approximately 1 h. One strain from each infected patient was serologically identified as group B streptococci.

One problem in treating patients systemically to eradicate \textit{S. agalactiae} involved the organism’s resistance to clindamycin, an antibiotic which was used to prevent group A streptococci from colonizing burns (Table 1). During the year, group A streptococci were isolated from graft sites of 17 patients undergoing reconstructive surgery. Autograft rejection due to group A streptococci in this population was infrequent, but controlled in individual patients with cloxacillin or dicloxacillin. During the months of July and August, 8 of the 11 acutely burned patients from whom \textit{S. agalactiae} was isolated including the 6 patients with rejected grafts were given either penicillin or oxacillin. The route and dosage of these antibiotics varied with each patient. The administration of these antibiotics coincided with an abrupt disappearance of \textit{S. agalactiae} in acute burns for the month of September (Fig. 1). Neither the use of these latter antibiotics nor clindamycin affected the majority of enterococcus strains in the burns of these same patients.

The exact role of \textit{S. agalactiae} in autograft rejection was difficult to interpret because

| Antibiotic          | \textit{S. agalactiae} | \textit{Enterococci} | Group A |
|---------------------|------------------------|----------------------|---------|
| Ampicillin (10)*    | 100                    | 96                   | 100     |
| Cephalothin (30)    | 100                    | 24                   | 100     |
| Erythromycin (15)   | 0                      | 56                   | 100     |
| Gentamicin (10)     | 0                      | 50                   | 100     |
| Kanamycin (30)      | 0                      | 5                    | 80      |
| Lincomycin (2)      | 0                      | 0                    | 100     |
| Clindamycin (2)     | 0                      | 0                    | 100     |
| Methicillin (5)     | 100                    | 2                    | 100     |
| Oxacillin (1)       | 100                    | 1                    | 100     |
| Penicillin (10)     | 100                    | 23                   | 100     |
| Sulfadiazine (250)  | 100                    | 2                    | 70      |

* Fifty-two strains all from acutely burned patients.
* Two-hundred fifty strains, all from acutely burned patients.
* Twenty-six strains, from 17 patients undergoing reconstructive surgery and 6 acutely burned patients.
* Figures in parentheses indicate antibiotic disk concentration in micrograms.

many nonbacterial factors may affect autografting success. The presence of other microorganisms in burns or at graft sites prior to the emergence of \textit{S. agalactiae}, however, was in no way related to graft infection. This organism should be considered potentially significant in acute-burn patients undergoing autografting.
and antibiotics to control both group A and group B streptococci may need to be given.

The origin of *S. agalactiae* was not determined. Frequently in burn units, an unusual organism previously unrecognized may abruptly appear. Periodic throat cultures of personnel and patients have detected the presence of group A strains but not group B streptococci. Milk is known to be a natural source of *S. agalactiae*. Grade A pasteurized milk is fed to acute patients in copious amounts either by mouth or by nasogastric tubes to act as a nutritional fluid replacement and to prevent Curling's Ulcer. Weekly environmental surveillance in the hospital included examination of the milk from 5-gal. dispensers, but the inclusion of blood agar and other selective streptococcal media have not revealed the presence of *S. agalactiae* or group A strains in milk.

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