

BACTERIOLOGY AND URINARY EXAMINATION IN IMPETIGO CONTAGIOSA¹

A prospective study in a Swedish urban area

Gunnel Bojs, Ingmar Juhlin and Halvor Möller

From the Departments of Dermatology and Clinical Bacteriology, University of Lund, Malmö, Sweden

Abstract. In a material of 397 cases of primary impetigo contagiosa collected during 2 consecutive years, the youngest age groups predominated. β -hemolytic streptococci were cultured from skin lesions in 29%. A follow-up study including a first control after 3 weeks and a second after 1 year was carried out in the first 201 patients. Among the cases of streptococcal impetigo with negative throat culture, half were treated with penicillin, the other half with topical antibiotics only. There were no signs of renal complication, either at the early control, or at the late one. Presumably, nephritogenic streptococci occurred in the material. Penicillin was found unnecessary for clinical cure.

In the last decade the question has arisen whether impetigo contagiosa should be considered a trifling and transient disorder limited to the skin, or a disease which may have a more serious implication. As a matter of fact, reports have accumulated on sequential renal lesions of exactly the same character as those traditionally known to follow streptococcal pharyngitis. Consequently, a prospective study including early and late controls was outlined with the following intentions: to chart the bacteriology of impetigo contagiosa in this particular geographic area; to disclose possible acute or chronic glomerulonephritis complicating streptococcal impetigo; and to evaluate the influence of penicillin on clinical healing and on possible renal damage.

MATERIAL AND METHODS

The material consisted of out-patients at the Department of Dermatology, Malmö General Hospital. The

department is the only one accepting patients from the urban area of Malmö (pop. 260 000). There are about 6 000 first-visits for skin disease each year.

The study comprised cases of impetigo contagiosa seen during the period January 1, 1971 to December 31, 1972. All cases of secondary infection dermatoses were excluded, i.e. only primary impetigo in otherwise normal-looking skin was accepted for the investigation.

Patients seen during the first 13 months of the study (January 1, 1971 to January 31, 1972) were treated at their first visit as follows: a clinical examination including a history of duration, of upper respiratory infection, and of topical therapy; number and distribution of skin lesions; a laboratory study including urinalysis for proteinuria (Albustix®) and pathologic sediment; bacteriologic culture from throat and skin lesions.

Swab samples were taken from throat and skin lesions and inoculated on peptone-blood agar plates. Presumptive identification of group A streptococci was performed with bacitracin discs, sodium nucleinate tablets (27) and confirmed by production of free haemolysins in trypsin broth (22). The streptococci were grouped by slide-agglutination (24). Some of the strains were sent to Prof. W. Köhler, Jena, DDR, for serological typing. The identification of the *Staph. aureus* was performed with tube coagulase test, DNase test, and phage typing.

Topical treatment was commenced with a neomycin-amphotycin cream (Ecomytron®, H. Lundbeck & Co. A/S, Copenhagen, Denmark) t.i.d., preceded by vigorous swabbing with chlorhexidine-water solution 0.05% (ACO Läkemedel AB, Solna, Sweden). If the result of throat culture, obtained 2-3 days later, showed growth of *Str. pyogenes* (in the following also called streptococci) therapy was supplemented with potassium penicillin V (Kävepenin®, AB Recip, Stockholm, Sweden, 0.4 g orally t.i.d. for 10 days. In cases of streptococci localized to the skin alone the patients were divided into two groups: only those with an uneven birthday date were prescribed penicillin as above, irrespective of extent of the pyoderma.

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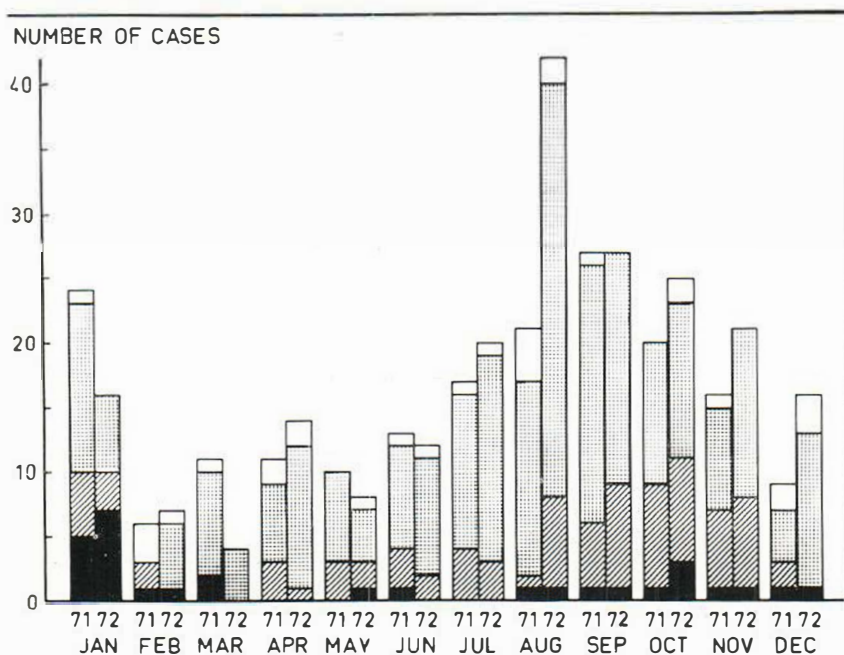


Fig. 1. Monthly distribution of 397 cases of impetigo contagiosa. Solid black columns: streptococci; hatched columns: streptococci and *S. aureus*; chequered col-

umns: *S. aureus*; open columns: non-pathogenic bacteria or negative culture.

Patients with streptococcal growth from skin lesions were encouraged to return after 3 weeks and again after 1 year. On these occasions clinical healing was checked, as well as urinalysis as above.

RESULTS

Total material. During the 2 years 1971–1972 there were 397 cases of impetigo contagiosa, 218 males and 179 females. Fig. 1 shows the monthly distribution as well as the bacteriologic findings in the skin lesions. It may be seen from the figure that the number of impetigo cases rose during late summer and early autumn. This was accompanied by a relative increase of *S. aureus*. The age distribution is given in Fig. 2, as well as findings of cutaneous streptococci in the various age groups.

The distribution of *S. aureus* and *Str. pyogenes* in the bacteriologic skin cultures from the total material of 397 impetigo cases was: *S. aureus* 64%, *Str. pyogenes* 8%, and combination of the two 21%. In a few cases the culture was negative, showed *S. albus* or α -hemolytic streptococci. Throat streptococci were demonstrated in 43 cases, in 32 cases of which the microbes were also found in the skin.

Follow-up material, first visit. The material used for the follow-up study consisted of 201 cases of impetigo occurring from January 1, 1971 to January 31, 1972. The monthly distribution is shown in Fig. 1.

The clinical examination showed a localization of skin lesions to the face in 78% of cases with cutaneous streptococci, and in 72% of cases without. An upper respiratory infection had preceded the impetigo in 50% of cases with cutaneous streptococci, and in 47% of cases without. Neither with regard to other clinical parameters, such as duration and number of skin lesions, nor localization other than the face, was there any difference between cases in which streptococci were or were not cultured from the skin. Sixteen patients of the 201 had been treated briefly with a topical antimicrobial preparation before their first visit, and only one had received a systemic antibiotic.

Urinary findings at the first visit were essentially normal. One patient out of the 201 had a pathologic sediment with microscopic hematuria but no pyuria or casts, and a negative Albustix®. Streptococci were cultured from her throat but not from her skin lesions. She was later found

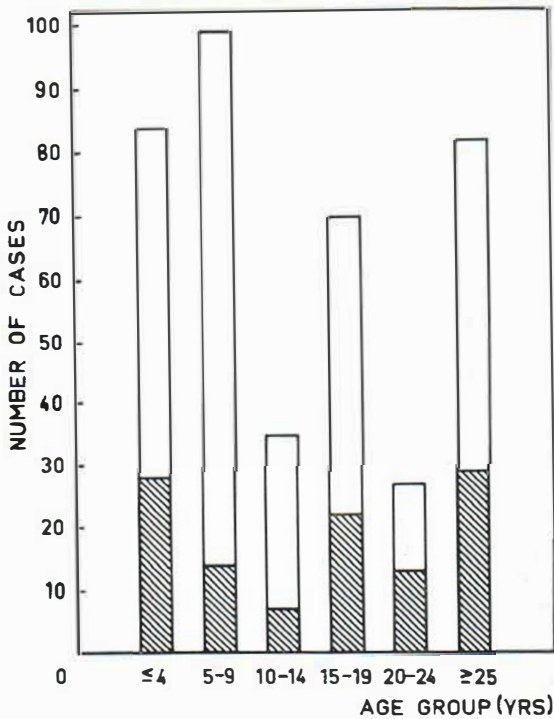


Fig. 2. Age distribution of 397 cases of impetigo contagiosa. Hatched columns: patients with cutaneous streptococci.

to have an acute glomerulonephritis. A second patient had a positive Albustix® as well as a microscopic pyuria and hematuria. These signs were found to be associated with an acute salpingitis. No streptococci were cultured from throat or skin in her case. In all other cases the sediments contained only slight amounts of protein, leukocytes, epithelial cells, i.e. within normal limits.

The results of cutaneous cultures in this limited material of 201 patients are given in Table I. It may be seen from the table that the bacterial flora was roughly the same as in the 2-year material. Thus, cutaneous streptococci were found in 66 patients, or 32% in this material.

Streptococci were isolated from the throat cultures of 30 patients in 21 cases of which the bacteria were also recovered from the skin. In another 45 patients streptococci were recovered only from skin lesions. Of these isolates 11 belonged to other groups or were non-groupable. 40 strains were sent for serological typing in Jena, and of these 23 could be typed serologically. One

Table I. Bacteriological findings in 201 cases of impetigo contagiosa used for the follow-up study

	Number	%
<i>S. aureus</i>	118	59
<i>Str. pyogenes</i>	21	10
Both species	45	22
Non-pathogenic bacteria or negative culture	17	8

strain belonged to group C and the others were either non-viable, spontaneously agglutinating or non-typable. The spectrum of types found can be seen in Table II.

Of the 66 impetigo patients with growth of streptococci from skin lesions, 21 patients were treated with penicillin because of concomitant throat streptococci. Of the remaining 45 patients, 23 obtained penicillin as a supplement to topical therapy, and 22 topical therapy only.

Follow-up material, second and third visits. Of the 66 impetigo patients with growth of streptococci from skin lesions, 61 appeared at the first revisit after 3 weeks, according to the control program. Forty-eight patients had healed completely; the remaining 13 did so in a further couple of weeks. Of these 13 patients, 7 had been treated with penicillin. The urinary examination at this control did not show any significant abnormalities.

Fifty-eight patients of the original 66 attended the 1-year control. On this occasion too the urinary examination failed to show any significant abnormalities.

Table II. T-antigen patterns in the 23 strains isolated from skin lesions

Number of strains	T-antigen	M-antigen	M-type not tested or non-typable (no. of strains)
1	T 1	M 1	—
1	T 4	M 4	—
2	T 4		2
2	T 8/25/Imp 19		2
1	T 11		1
1	T 12		1
1	T 13 monospec.		1
1	T 13/B3264		1
4	T 25		4
6	T 41		6
1	T 5/27/44		1
2	T 49		2

DISCUSSION

The age distribution in the present material of impetigo contagiosa shows a predominance of the youngest groups (Fig. 2) which is in agreement with the distribution in similar materials (2, 7, 15, 18, 30). A relatively low incidence of impetigo during spring and early summer, with an increase during late summer and early autumn, was observed in our material (Fig. 1) as well as in earlier Swedish works (4, 15).

The bacteriology of pyoderma varies considerably from one material to another. In a Baltimore (USA) population, streptococci were cultured from the skin in 63% of cases (11), and on an American Indian reservation the high streptococcal figure of 82% was registered (2). This latter finding may be explained by the composition of the material, i.e. a high contribution of secondarily infected dermatoses in a population with low socio-economic standards. Similarly, streptococci were found in 53% of pyoderma cases among Vietnam war casualties (1).

In the present material of purely primary impetigo a much lower figure of 29% for streptococcal frequency was recorded. This should be compared with 46% in a Cairo population with the same diagnosis (30) and with 21% in a London population (7). This latter figure may be too low because of preceding therapy, systemic or topical. On the other hand, in an earlier Swedish material (5) the frequency was as low as 7 out of 47 patients. We believe our culture results should be considered reliable since only a few of our patients had received antimicrobial therapy before examination.

In old literature it is often postulated that the bacteriology of impetigo contagiosa may be deduced from the patients's history or the clinical picture. This is supported by Wannamaker (28), but not by the work of Markowitz et al. (18), or by the present study.

When deciding upon the optimal follow-up schedule to disclose possible renal damage, a period of 3 weeks was chosen for the first visit. Apparently, the latent period between pyoderma and acute nephritis is about 3 weeks, i.e. longer than that following pharyngitis (28). Nevertheless, the urinary examination did not show any significant abnormalities at this point. This is in agreement with other workers (1, 7, 14) who

also performed short-term urinary controls after streptococcal pyoderma with negative results.

Chronic glomerulonephritis could also be excluded in our material by the essentially negative 1-year control in all cases. Such a long-term control in a prospective study of impetigo contagiosa has not been carried out previously.

Several investigators have reported renal damage following streptococcal pyoderma. Thus Markowitz et al. (18) noted a nephritis frequency of 3.4% in children with cutaneous infection with streptococci. The equivalent figure in the study of Anthony et al. (2) was 3.2%. Burnett (6), and Ferrieri et al. (12), in similar though small materials, observed isolated cases.

Apparently, there is a real risk for acute nephritis in patients with streptococcal pyoderma. The completely negative urinary examination after a short as well as a prolonged interval in the present material, just as in other reports quoted above, may be explained on a clinical basis. Materials with nephritis following streptococcal pyoderma contain a smaller or larger contribution of secondary infection dermatoses, while we have selected patients with a primary impetigo only. It might also be a question of climate or socio-economic standards.

An even more important factor in the pathogenesis of post-infectious nephritis may be the presence in the skin of nephritogenic streptococci. This was underlined by Parker (20) and Wannamaker (28), who calculated the attack rate as 10–15% after infection with known nephritogenic strains. The 23 strains that were serologically typed showed no less than 12 different T-patterns and at the most 6 strains belonged to the same type, T 41 (Table II).

Only 6 of the strains isolated from skin lesions showed the four T-agglutination patterns which are known to be included as members of nephritogenic M-types, viz.

T 8/25/Imp 19: M 55 (ref. 23) or M 57 (ref. 21) or M 2 (ref. 10) or M 49 (ref. 26).

T 49: M 49 (ref. 19).

T 3/13/B3264: M 41, M 52, M 53 (ref. 25) or M 56 (ref. 3).

T 5/27/44: M 12 (ref. 9).

Four of the six strains were M-typed with the available M-antisera with a negative result but the set of M-antisera was not complete. Another 2 patients had M 1 and M 4, resp., in their skin

lesions (Table II), these types being known to be nephritogenic, particularly when associated with tonsillitis. The rather low frequency of presumably nephritogenic strains in this material might thus be the reason for the lack of acute glomerulonephritis in these patients. On the other hand, the material included T-types which are known to harbour nephritogenic M-types.

The optimal treatment for impetigo contagiosa has been a matter of dispute. For clinical healing, intramuscular penicillin has been found superior to topical gentamycin, neomycin and bacitracin (8, 11), and even systemic erythromycin has been advocated (13). In the present material there was no difference in the cure rate between cases treated with penicillin plus topical neomycin-amphotomycin and cases with topical therapy only. After exclusion of cases with throat streptococci, the number of patients with streptococcal impetigo was similar in the two groups thus treated.

However, penicillin treatment of impetigo contagiosa might be motivated as a prophylaxis against secondary nephritis. This is a policy recommended in rheumatic fever and nephritis associated with streptococcal pharyngitis. The possibility of prohibiting renal complication after streptococcal pyoderma by penicillin has, however, been seriously questioned (8, 17, 29), mainly because such complications have been registered despite adequate penicillin treatment (16, 18). Since no signs of glomerulonephritis were observed in our patients, either in those treated with penicillin, or in those who were not, we were unable to take a stand in this question.

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Halvor Möller, M.D.
Department of Dermatology
Malmö General Hospital
S-214 01 Malmö
Sweden