Original Article

Access this article online
Website: www.afrjpaedsurg.org
DOI: 10.4103/0189-6725.143141
Quick Response Code:

Burns injury in children: Is antibiotic prophylaxis recommended?

Jamila Chahed, Amine Ksia, Wieme Selmi, Saida Hidouri, Lassaad Sahnoun, Imed Krichene, Mongi Mekki, Abdellatif Nouri

ABSTRACT

Background: Wound infection is the most frequent complication in burn patients. There is a lack of guidelines on the use of systemic antibiotics in children to prevent this complication. **Patients and Methods:** A prospective study is carried out on 80 patients to evaluate the role of antibiotic prophylaxis in the control of infections. **Results:** The mean age was 34 months (9 months to 8 years). There was a male predominance with sex ratio of 1.66. The mean burn surface size burn was 26.5% with total burn surface area ranging from 5% to 33%, respectively. According to American Burn Association 37% (30/80) were severe burns with second and third degree burns >10% of the total surface body area in children aged <10 years old. Scalds represented 76.2% (61/80) of the burns. Burns by hot oil were 11 cases (13.7%), while 8 cases (10%) were flame burns. The random distribution of the groups was as follow: Group A (amoxicilline + clavulanic acid) = 25 cases, Group B (oxacilline) = 20 cases and Group C (no antibiotics) = 35 cases. Total infection rate was 20% (16/80), distributed as follow: 8 cases (50%) in Group C, 5 cases (31.2%) in Group A and 3 cases in Group B (18.7%). Infection rate in each individual group was: 22.9% (8 cases/35) in Group C, 20% (5 cases/25) in Group A and 15% (3 cases/20) in Group B ($P = 0.7$). They were distributed as follow: Septicaemia 12 cases/16 (75%), wound infection 4 cases/16 (25%). Bacteria isolated were with a decreasing order: *Staphylococcus aureus* (36.3%), *Pseudomonas* (27.2%), Escherichia *coli* (18.1%), *Klebsiella* (9%) and *Enterobacteria* (9%). There is a tendency to a delayed cicatrisation ($P = 0.07$) in case of hot oil burns (65.18 ± 120 days) than by flame (54.33 ± 19.8 days) than by hot water (29.55 ± 26.2 days). Otherwise no toxic shock syndrome was recorded in this study. **Conclusion:** It is concluded that adequate and careful nursing of burn wounds seems to be sufficient to prevent complications and to obtain cicatrisation. Antibiotics are indicated only to treat confirmed infections.

Key words: Antibiotic prophylaxis, burns, children

INTRODUCTION

Wound infection is the most frequent complication in burn patients. It occurs generally during the 2nd week after injury and exposes to toxic shock syndrome (TSS), which is a life threatening illness particularly in children.[1,2] The theoretical basis for this is that due to their low levels of toxic shock syndrome toxin- antibody, children are at increased risk from wound infection and hence TSS. There is a wealth of information on the management of burns in children; however there is a lack of guidelines on the use of antibiotics, in particular prophylaxis to prevent TSS. The early excision of eschar and avascularised tissues improves the perfusion of the burned tissue, and allows systemic antibiotics to reach adequate therapeutic levels in the burn tissue. Antibiotics are considered useful in the treatment of infections in burn victims, but there is a considerable debate concerning the use of antibiotic prophylaxis for the prevention of burn wound infection and TSS in children.[3-7]

The aim of this study is to assess whether systemic antibiotic prophylaxis in children prevents wound infection and potential lethal complications.

PATIENTS AND METHODS

This was 5 years (2008-2013) prospective study in the paediatric surgery Department of Fattouma Bourguiba Teatching Hospital in Monastir –Tunisia. It is a single-blind univariate study. A total of 80 patients were admitted. Inclusion criteria were age (3 months to 15 years), hospitalization within the first 48 h from the accident, and absence of antibiotic intake before

Department of Pediatric Surgery, EPS Fattouma Bouguiba, Faculty of Medicine, Monastir, CP 5000, Tunisia

Address for correspondence:
Dr. Jamila Chahed,
Department of Pediatric Surgery, EPS Fattouma Bouguiba,
Faculty of Medicine, Monastir, CP 5000, Tunisia.
E-mail: j.chahed@voila.fr

hospitalization. Children who had chemical or electric burns, first degree burns and immunocompromised patients were excluded in the study. Patients were randomly included into one of three groups: First Group A received ampicilline-clavulanic acid (Augmentin®) 100 mg/kg/day, second Group B received oxacilline (Bristopen®) 50 mg/kg/day and the third Group C didn't receive any antibiotic.

Management of wound burns was the same for all patients. Local burn wound care consists of cleansing with povidone-iodine and surgical debridements when necessary followed by sulfadiazine (flammazine — 1%) application and wound dressings. Mebo cream is applied in case of face wound burns. In noninfected wounds, local care and dressings are repeated every 2 days, and daily when infected. No local antibiotics are used. Skin grafts were indicated when necessary (especially when there was no wound cicatrisation). All patients had blood tests at the 1st day of hospitalisation: Blood count, C-reactive protein, bacterial samples from skin burns. Wound samples were repeated systematically once a week and in case of clinical symptoms of wound infection.

Burn wound infection [Figure 1] is suspected on clinical symptoms: Change in colour of the burnt area or surrounding skin, purplish discolouration, particularly if swelling is present, change in thickness of the burn (the burn suddenly extends deep into the skin), greenish discharge or pus and fever. Blood culture and blood count were repeated in case of fever and burn wound infection. IBM SPSS Statistics 18.

RESULTS

In total, 80 patients were included in this study to the department. The mean age was 34 months (9 months to 8 years). There was a male predominance with sex ratio of 1.66. The mean burn surface size burn was 26.5% with total burn surface area ranging from 5% to 33% (5% corresponds to a second degree scald of the hemiface).



Figure 1: Burn infection of the face

About 37% (30/80) were severe burns, with second and third degree burns >10% of total surface body area in children aged <10 years old. Scalds represented 76.2% (61/80) of the burns. Burns by hot oil were 11 cases (13.7%), while 8 cases (10%) were flame burns.

The random distribution of the groups was as follow: Group A = 25 cases, Group B = 20 cases and Group C = 35 cases.

Total infection rate was 20% (16/80), distributed as follow: 8 cases (50%) in Group C, 5 cases (31.2%) in Group A and 3 cases in Group B (18.7%). Infection rate in each individual group was: 22.9% (8 cases/35) in Group C, 20% (5 cases/25) in Group A and 15% (3 cases/20) in Group B ($P = 0.7$). They were distributed as follow: Septicaemia 12 cases/16 (75%), wound infection 4 cases/16 (25%). The bacteria isolated were with a decreasing order: *Staphylococcus aureus* (36.3%), *Pseudomonas* (27.2%), *Escherichia coli* (18.1%), *Klebsiella* (9%) and *Enterobacteria* (9%).

There was a tendency to a delayed cicatrisation ($P = 0.07$) in case of hot oil burns (65.18 ± 120 days) than by flame (54.33 ± 19.8 days) than by hot water (29.55 ± 26.2 days). Otherwise no TSS was recorded in this study.

DISCUSSION

Burn wounds are usually sterile immediately after injury. However by the end of the 1st week of admission, over 90% of them are colonised by bacteria. This colonization may lead to local infection associated or not to systemic infection.[6] In general, prophylactic antibiotics are not used because of risk of resistant strains emergence. The recommended practice in adults is to take culture swabs at admission and dressing changes and only treat overt infection or serious colonisation.[7]

Although there is a wealth of information on the management of burns in children, there is a lack of guidelines on the use of antibiotics,[1,8,9] in particular prophylaxis to prevent wound infections and TSS. This study confirmed the uselessness of antibiotics in preventing wound infection in children burns. Antibiotic prophylaxis is reported to be of little use. It

can even cause severe problems with resistance mainly against cephalosporins and other betalactams as well as quinolones in intensive care units.[8-14]

The low rate of wound infection in our study compared to what is reported in literature could reflect an acceptable management level. However according to some authors, differences in wound infection rates may be related to differences in criteria of wound infection and the use of topical antimicrobials.[10-13] Septicaemia was relatively high and this may be explained by high wound colonization. Unfortunately wound swabs couldn't be practiced regularly in our burn unit to confirm our hypothesis. Concomitant blood cultures and wound swabs should be practiced in these cases. Although some authors report that antibiotic prophylaxis prevents TSS in burns,[9] this was not our experience in this study as there was no TSS in any of the three groups. We believe that antibiotics prophylaxis in burns wounds results in unnecessary costs and may induce antibiotic resistance.

According to guidelines of the French Society for Burn Injuries (SFETB), no antibiotics without proven infection and a local infection requires a local treatment. However, when the local infection is associated with general signs of infection, antibiotics may be used. Furthermore, antibiotics prophylaxis could be used in patients needing invasive surgery (excisions, flaps), but not in dressing changes.[15]

The authors of the review dealing with antibiotic prophylaxis for preventing burn wound infection suggested that the effects of antibiotic prophylaxis in burn patients have not been studied sufficiently. Clinical trials with adequate statistical power are required to evaluate the effects of the different modalities of antibiotic prophylaxis (topical, general systemic, perioperative systemic, selective digestive decontamination, and delivered by airway), compared with placebo or standard treatment on the prevention of burn wound infection (burn wound infection), other infections, or mortality associated with infection.[1]

CONCLUSION

According to our results adequate and careful nursing of burn wounds seems to be sufficient to prevent complications and to obtain cicatrisation. Antibiotics are indicated only to treat confirmed infections. Future randomised trials should be designed and conducted rigorously to verify antibiotic prophylaxis.

REFERENCES

1. Rashid A, Brown AP, Khan K. On the use of prophylactic antibiotics in prevention of toxic shock syndrome. Burns 2005;31:981-5.
2. Young AE. The management of severe burns in children. Curr Pediatr 2004;14:202-7.
3. Barajas-Nava LA, Lopez-Alcalde J, Roqué i Figuls M, Sola I, Bonfill Cosp X. Antibiotic Prophylaxis for Preventing Burn Wound Infection. Review. The Cochrane Collaboration. Iberoamerican centre, institute of Biomedical Research (IIB Sant Pau), Barcelona, Spain. Published by John Wiley and Sons, Ltd.; 2013.
4. Avni T, Levcovich A, Ad-El DD, Leibovici L, Paul M. Prophylactic antibiotics for burns patients: Systematic review and meta-analysis. BMJ 2010;340:c241.
5. Brown AP, Khan K, Sinclair S. Bacterial toxicosis/toxic shock syndrome as a contributor to morbidity in children with burn injuries. Burns 2003;29:733-8.
6. Ugburo AO, Atoyebi OA, Oyeneyin JO, Sowemimo GO. An evaluation of the role of systemic antibiotic prophylaxis in the control of burn wound infection at the Lagos University Teaching Hospital. Burns 2004;30:43-8.
7. Rowlands RJ, Roland D. Antibiotics in childhood burns. Burns 2011;37:359-60.
8. National Burn Care Review, 2001. Standards and Strategy for Burn Care: A review of Burn Care in the British Isles. Available from: http://www.nbcg.nhs.uk/national-burn-care-review. [Last accessed on 2008 Oct 23]
9. WHO 2014 Hospital Care for Children in Developing Countries Handbook. Available from: http://www.whqibdoc.who.int/publications/2013/9789241548373.pdf.
10. Appelgren P, Björnhagen V, Bragderyd K, Jonsson CE, Ransjö U. A prospective study of infections in burn patients. Burns 2002;28:39-46.
11. Wurtz R, Karajovic M, Dacumos E, Jovanovic B, Hanumadass M. Nosocomial infections in a burn intensive care unit. Burns 1995;21:181-4.
12. Taylor GD, Kibsey P, Kirkland T, Burroughs E, Tredget E. Predominance of staphylococcal organisms in infections occurring in a burns intensive care unit. Burns 1992;18:332-5.
13. Peck MD, Weber J, McManus A, Sheridan R, Heimbach D. Surveillance of burn wound infections: A proposal for definitions. J Burn Care Rehabil 1998;19:386-9.
14. Hanberger H, Nilsson LE, Swedish Study Group. High frequency of antibiotic resistance among Gram-negative isolates in intensive care units at 10 Swedish hospitals. Clin Microbiol Infect 1997;3:208-15.
15. Ravat F, Le-Floch R, Vinsonneau C, Ainaud P, Bertin-Maghit M, Carsin H, *et al*. Antibiotics and the burn patient. Burns 2011;37:16-26.

Cite this article as: Chahed J, Ksia A, Selmi W, Hidouri S, Sahnoun L, Krichene I, *et al*. Burns injury in children: Is antibiotic prophylaxis recommended?. Afr J Paediatr Surg 2014;11:323-5.

Source of Support: Nil. **Conflict of Interest:** None declared.