

ORIGINAL ARTICLE

APPROPRIATENESS OF USE OF AN ANTIMICROBIAL (BETADINE) VERSUS DRY CORD CARE IN NEWBORNS FROM AN URBAN SLUM

Ashwin Borade, Anuradha Khadilkar, Neeta Hanumante, Sandesh Runwal

Abstract

Background: The umbilical cord is the first site of bacterial colonization in the newborn and current cord care practices include aseptic techniques in cutting the cord, meticulous hand washing by health professionals and placement of the cord outside the diaper area. The need for continued treatment of the cord stump in developing countries such as India has not been widely studied. **Aims:** To compare outcome of povidone iodine application versus dry umbilical cord care. **Secondary objective** was to study local cord care practices in an urban slum in Pune, India. **Settings and Design:** A case-control study carried out at hospital. **Materials and Methods:** For this pilot study, 200 consecutive healthy full term babies born in hospital to mothers residing in an urban slum were enrolled. Povidone iodine was applied to the cord in 100 babies while 100 babies received dry cord care. **Statistical Analysis:** All the statistical analyses were performed using statistical package for social sciences (SPSS Inc., Chicago, USA) version 11.0 for Microsoft Windows. **Results:** Two babies (2.1%) in each group showed signs of omphalitis, average age when the cord separated was earlier in the non-treatment than in the treatment group ($p=0.0$). Among the various home based cord care practices, oil application was the most prevalent (34% treatment group; 43.6% non-treatment group). **Conclusion:** Natural drying is an economical and safe method for cord care for babies born in hospitals with no greater incidence of infection, even though they may be going home to a slum environment.

Key words: umbilical cord; urban slum; povidone iodine; dry

Introduction

There have been improvements in childcare and health the world over, but neonatal mortality remains a leading cause of death in developing countries. Systemic bacterial infection is an important cause of neonatal morbidity and mortality worldwide. [1] Neonatal infections currently cause about 1.6 million deaths annually in developing countries and according to the National Neonatal Perinatal Database (2002-2003), the incidence of neonatal sepsis in India was 30 per 100 live births. [2,3] The umbilical cord is the first site of bacterial colonization in the newborn and pathogens can enter the bloodstream through the patent vessels of the newly cut cord. [4] Contamination of the umbilical cord can lead to omphalitis, characterized by pus, abdominal erythema or swelling.

Studies from developed countries have shown that with aseptic delivery and cord cutting practices need for continued bactericidal treatment of cord is in question and natural drying of cord is probably a better choice. [5,6] Current and accepted cord care practices include aseptic techniques in cutting the cord, meticulous hand washing by health professionals and placement of the cord outside the diaper area to encourage drying. The Indian Academy of Pediatrics

in its text book advises the application of triple dye or ethyl alcohol to the tip and around the base of the umbilical stump every day to prevent colonization. [7] However the need for continued treatment of the cord stump in developing countries such as India has not been widely studied. The problem is more acute in slums where obstetric and neonatal care is less and the home environmental conditions are likely to be unhygienic. We thus conducted a study to compare the outcome of povidone iodine application versus dry umbilical cord care in newborn babies born in hospital to mothers residing in an urban slum in Pune, Western Maharashtra. Our secondary objective was to study local cord care practices in these babies.

Materials and Methods

A study was carried out in hospital from Feb 2007 to April 2008. For the purpose of this open, pilot study, two hundred consecutive healthy full term babies born in hospital to mothers residing in an urban slum in Pune, Western Maharashtra were enrolled in the study. Babies who were admitted in NICU were excluded from the study. Primary outcome was the occurrence of umbilical cord infection. The Hospitals Institutional Ethics Committee approved the study and written informed consent was obtained from all mothers. Women were approached for enrolment by one of the investigators (AB or SR) and study procedures were explained. All women had received routine immunization for tetanus during the antenatal period. All babies were roomed in immediately after birth and were exclusively breast fed.

Babies received two different umbilical cord care regimes: povidone iodine application or dry cord care (AB and SR assigned participants to the two groups). These were administered to babies born on even & odd days respectively. Betadine is an iodinated polyvinyl polymer (10% aqueous solution of povidone-iodine) used as a topical antiseptic. It is a fast-acting, broad-spectrum antiseptic that kills gram-positive and gram-negative bacteria. [8] Mothers in both groups received education on caring for the cord. Mothers of babies assigned to the povidone iodine group were instructed to wash hands with soap and water then moisten a cotton ball with povidone iodine solution and gently dab the umbilical cord stump twice a day for 7 days. In the control group (dry cord care) education was given regarding cord care and the umbilical stump was kept clean by wiping it dry after soiling and bathing. In the hospital and at each home visit, signs of umbilical cord infection including pus, redness (inflammation) and swelling (oedema) of the cord stump and skin at the base of the stump were noted.

Mothers and the study nurse were educated to identify umbilical cord infection. Babies were followed daily for the first 7 days then every 3 days either in the urban health care centre attached to the hospital or at home by the study nurse, till the baby was one month old. Mothers were interviewed using a semi-structured, questionnaire containing both open-ended and close-

ended questions pertaining to cord care practices.

All the statistical analyses were performed using statistical package for social sciences (SPSS Inc., Chicago, USA) version 11.0 for Microsoft Windows. Associations between categorical variables such as presence of omphalitis in the two groups were tested using chi square test. Comparison of numerical variables e.g. birth weight, length of cord, etc. amongst two groups was done by Student's t test. Analysis was not performed on intention to treat basis. Data are presented as mean (standard deviation).

Results

Table 1 shows comparison between the treatment (povidone iodine) and the dry cord care group. In the treatment group 3 patients were lost to follow up, 2 changed to the non treatment group and one was admitted to the neonatal intensive care unit for hypocalcaemic convulsions, hence was not included in the analysis. Data are thus presented on 94 (m = 46, f = 48) babies. In the non-treatment group 6 babies were lost to follow up, hence data are presented on 94 subjects (m= 52, f= 42). There was no significant difference in the birth weight (p= 0.5, 95% CI -0.06 to 0.17) and average length of cord in the two groups (p= 0.4, 95% CI 0.02 to 0.48). Two babies (2.1%) in each group showed signs of omphalitis (p= 0.7, 95% CI -0.40 to 0.40) and the average age when the cord involuted and separated was earlier in the non-treatment than in the treatment group (p= 0.0, 95% CI 0.06 to 1.34). (Table 1)

Among the various home based cord care practices, number of babies receiving other cord care was not different in the two groups (p= 0.4, 95% CI 0.67 to 4.34). Oil application was the most prevalent (34% treatment group; 43.6% non-treatment group), other practices being application of boric powder (0.5%), turmeric (1%) or pressure bandage (0.5%) to the cord. Table 1 Comparison between the treatment (povidone iodine) and the dry cord care group.

Parameter	Treatment-Group	Non-treatment-Group	P value
Birth Weight in Kg (SD)	2.6 (0.4) n=92	2.6 (0.4) n=94	0.5
Average length of cord in cm (SD)	1.6 (0.8) n=90	1.4 (0.8) n=89	0.4
Day when cord fell (SD)	6.6 (2.5) n=94	5.9 (1.9) n=93	0.0
Babies with Omphalitis (%)	2(2.1)n=94	2(2.1)n=94	0.7
B a b i e s receiving other cord care after discharge (%)	49(52.1) n=94	45(47.9) n=94	0.4

SD -Standard deviation

Discussion

Our study done on full term breast fed new born babies born in hospital to mothers who had received immunization against tetanus and came from an urban slum showed that their was no statistically significant difference in the incidence of omphalitis and in the non-treatment and treatment (povidone iodine) groups. The average time required for separation of the cord was shorter in the non-treatment than in the treatment group. Two babies from each group (2.1%) had signs of umbilical infection and none of the babies showed any signs of systemic infection till 30 days of life. Singhal et al have reported 3% incidence of umbilical infection in an Urban slum in Delhi while other developing countries have reported, in hospital-based studies, an incidence varying from 2-77 per 1000 hospital-born babies . [9,10] The average age for separation of the umbilical cord was 6.6 and 5.9 days which are in keeping with other reports . [11] Wilson et al have reported the delayed separation of cord after the application of antimicrobials though the medical significance of late separation is not known. [12]

Research from developed countries has shown that, compared to no treatment, application of a topical antimicrobial to the cord stump reduces umbilical colonization by harmful bacteria in hospital nurseries. [13] The effect of topical antimicrobials in reducing infections is not as yet that clear. Commonly used agents are Chlorhexidine, tincture of iodine, povidone-iodine, triple dye or silver sulphadiazine. A community based study from Nepal has reported a reduction in the frequency of Omphalitis in babies with Chlorhexidine application to the cord. [10] However there is no conclusive evidence for the widespread use of antimicrobials for cord care and the WHO recommends dry cord care after discharge from hospital, even in developing countries. [14]

In the babies we studied, almost 50% newborns had some traditional cord care administered after they were discharged from hospital. The commonest practice was the application of oil to the umbilical stump. In a study on newborns in Nepal, 47% babies had mustard oil applied to the cord and risk of infection risk was 29% higher in these babies. Ash, oil, butter, spice pastes, herbs and mud are substances that are commonly used. [15] These substances are often contaminated with bacteria thus increase the risk of infection. Application of cow dung to the stump is associated with a high risk of neonatal tetanus. Ghee application has also been found to be a risk factor for tetanus. [16] In many cultures it is common to bind the newborn's abdomen with cloth or bandages. This practice keeps the stump moist, thus delaying healing and increasing the risk of infection.

In hospitals, if newborns are kept in nurseries or in intensive care units, it is probably best to apply topical antimicrobials to the cord stump to prevent umbilical colonization with pathogenic bacteria and for the prevention of cross infections. In areas at high risk of neonatal tetanus or where harmful practices such as putting cow dung on the stump are prevalent, the WHO recommends that an antimicrobial may be used to replace the harmful substance. [14]

In India, like in other developing countries, health services are overstretched and there is a shortage of trained manpower for delivering health programs. [17] Though our study has been done on a small number of patients and due to economic constraints cord culture has not been performed, our results suggest that natural drying is an economical and safe method for cord care for babies born in hospitals, with no greater incidence of infection, even though they may be going home to a slum environment. In addition to dry cord care and meticulous hand washing, it is important to emphasize the avoidance of unclean cord applications. Larger studies are required to confirm our observations.

Contributors: AB, NH, AK and SR were involved in planning the study. AB, NH and SR were involved in data collection. All authors were involved in preparing the manuscript. AVK will act as guarantor of the study.

Funding - None.

Competing interest - None

Acknowledgement: We would like to thank all the parents and babies who were part of this study. We also thank the nursing staff at urban health center, Ruby Hall Clinic, Pune for their participation in recruitment and follow up of subjects. We thank Dr. K. B. Grant, Founder of Grant Medical Foundation, for allowing us to do this study.

References

1. Garner P, Lai D, Baea M, Edwards K, Heywood P. Avoiding neonatal death: an intervention study of umbilical cord care. *J Trop Pediatr.* 1994; 40: 24-28
2. Vergnano S, Sharland M, Kazembe P, Mwansambo C, Heath PT. Neonatal sepsis: an international perspective. *Arch Dis Child Fetal Neonatal Ed.* 2005; 90: F220-224
3. Sankar MJ, Agarwal R, Deorari AK, Paul VK. Sepsis in the newborn. *Indian J Pediatr.* 2008; 75: 261-266
4. Gillespie WA, Simpson K, Tozer RC. Staphylococcal infection in a maternity hospital; epidemiology and control. *Lancet.* 1958; 2: 1075-1080
5. Medves JM, O'Brien BA. Cleaning solutions and bacterial colonization in promoting healing and early separation of the umbilical cord in healthy newborns. *Can J Public Health.* 1997; 88: 380-382
6. Bourke E. Cord care: too much or too little. *Aust J Adv Nurs.* 1990; 7: 19-22
7. Singh M, Deorari A. Care of a Normal Newborn Baby. In: *IAP Textbook of Pediatrics*, 3rd edn. Eds. Parthasarathy A, Nair MKC, Menon PSN, Shah R, Shah N, Sachdev HPS, Thacker N, Agarwal B, Ugra D, Choudhary P, Balachandran A. New Delhi, Jaypee Brothers Medical publishers(P) Ltd, 2006; pp 48-53
8. Burks RI. Povidone-iodine solution in wound treatment. *Phys Ther.* 1998; 78: 212-218
9. Singhal PK, Mathur GP, Mathur S, Singh YD. Neonatal morbidity and mortality in ICDS urban slums. *Indian Pediatr* 1990; 27: 485-488
10. Mullany LC, Darmstadt GL, Khatry SK, Katz J, LeClerq SC, Shrestha S et al. Topical applications of chlorhexidine to the umbilical cord for prevention of omphalitis and neonatal mortality in southern Nepal: a community-based, cluster-randomised trial. *Lancet.* 2006; 367: 910-918
11. Singh N, Sharma S, Singh R. Umbilical cord fall in preterm and term newborns in vaginal and caesarean deliveries. *Indian Pediatr.* 1999; 36: 588-590
12. Wilson CB, Ochs HD, Almquist J, Dassel S, Mauseth R, Ochs UH. When is umbilical cord separation delayed? *J Pediatr.* 1985; 107: 292-294
13. Johnson JD, Malachowski NC, Vosti KL, Sunshine P. A sequential study of various modes of skin and umbilical care and the incidence of staphylococcal colonization and infection in the neonate. *Pediatrics.* 1976; 58: 354-361
14. World Health Organization. Care of the umbilical cord. WHO/FHE/MSM-cord care. WHO; Geneva: 1998.
15. Mullany LC, Darmstadt GL, Katz J, Khatry SK, LeClerq SC, Adhikari RK, Tielsch JM. Risk factors for umbilical cord infection among newborns of southern Nepal. *Am J Epidemiol.* 2007; 165: 203-211
16. Bennett J, Ma C, Traverso H, Agha SB, Boring J. Neonatal tetanus associated with topical umbilical ghee: covert role of cow dung. *Int J Epidemiol.* 1999; 28: 1172-1175
17. Banerjee B. Maternal Care Rendered at an Urban Health Centre of a Metropolitan City. *Indian Journal of Community Medicine* 2006; 31: 183-184

From: Growth and Pediatric Endocrine Unit, Hirabai Cowasji Jehangir Medical Research Institute, Jehangir Hospital, Pune, India

Address for Correspondence: Dr. Anuradha Khadilkar, Senior Research Officer, Hirabai Cowasji Jehangir Research Institute, Old Building Basement, Jehangir Hospital, 32, Sassoon Road, Pune, Maharashtra, 411001, India. E-mail: akhadilkar@vsnl.net, ashwinborade@yahoo.com

Published: March 2010
