



Safety of Arnica/Echinacea Powder in the Care of the Umbilical Stump

Elisabetta Scurati-Manzoni^{1*}, Diego Luotti², Federica Poletti³,
Raffaella Visentin¹, Gianbanchisio Melis¹ and Andrea Guala¹

¹Struttura Operativa Complessa Pediatria, Ospedale Castelli, Verbania, Azienda Sanitaria Locale VCO, Italy.

²Pediatric Family Practitioner, Azienda Sanitaria Locale VCO, Verbania, Italy.

³Struttura Operativa Complessa Malattie Infettive, Ospedale Castelli, Verbania, Azienda Sanitaria Locale VCO Verbania, Italy.

Authors' contributions

This work was carried out in collaboration between all authors. Authors ESM and AG wrote the first draft and the final draft of the manuscript. Authors AG, ESM, GM and FP managed the literature searches. Authors AG, DL and RV collected the data of our cases. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JSRR/2015/14969

Editor(s):

(1) Amit Balakrishnan, School of Pharmacy, University of Maryland, Baltimore, USA.

Reviewers:

(1) James Adam, School of Pharmacy, University of Southern California, USA.

(2) Anonymous, USA.

Complete Peer review History: <http://www.sciencedomain.org/review-history.php?iid=752&id=22&aid=7807>

Clinical Practice Article

Received 30th October 2014
Accepted 7th January 2015
Published 19th January 2015

ABSTRACT

The main concerns about neonates' umbilical stump are delay in its falling, umbilical cord infections and bleeding. Optimal umbilical cord care is therefore an important issue for both nurseries' staff and neonates' caregivers. Many investigators have explored the optimal cord care treatment. Among current umbilical cord care options, topical application of chlorhexidine decreases omphalitis and neonatal mortality, both in primary and community care settings in developing countries; whereas dry cord care has proved to be adequate in hospital settings, in developed countries.

We here report our experience on arnica/echinacea powder, a safe method of treating the umbilical cord in developed countries.

*Corresponding author: Email: lisa.scurati@libero.it;

Keywords: Umbilical cord care; omphalitis; chlorhexidine; arnica/echinacea powder.

1. INTRODUCTION

The umbilical cord, a structure composed of specific connective tissue (Wharton's jelly) and blood vessels, connects the fetus to the placenta, in utero [1]. Once cut after birth, the baby becomes independent, while the remnant umbilical stump dries gradually, mummifies and then falls off: the average retention time of the umbilical stump varies from 3 to 45 days, mean separation time being of 13.9 days [2].

The fall of the umbilical cord is a physiological process and is the result of a complex interaction between enzyme activity and granulocyte function [2]. Many perinatal factors (i.e. Caesarean section, low gestational age, prematurity, administration of antibiotics because of sepsis), are associated with a delay in the fall of the stump [2,3].

Care of the newborn babies' umbilical stump is a daily practice in nurseries; however, methods of treatment differ from country to country.

Optimal umbilical stump treatments, for both the first 24 hours of life and the first weeks until the umbilical stump spontaneously separates from the body, have been studied on many occasions [4,5]. Among several compared treatment options, a few have shown to delay umbilical cord's separation time. Yet, most treatments, when compared with dry cord care especially in developing countries, have been associated with a reduced risk of secondary infections. Besides, initial treatment options vary notably from hospital to hospital: some apply triple dye, chlorhexidine, or povidone iodine, others don't administer any treatment.

Also, recommendations for home management of the umbilical cord range from daily applications of alcohol, to soap and water washings or to non-treatment [4].

2. TREATMENT RATIONALES

The main concerns about the umbilical stump are delay in its falling, umbilical cord infections and their implications, and bleeding.

During its necrotizing process, the umbilical cord stump can be a potential source of entry and growth for pathogenic microorganisms, causing morbidity and mortality. It is well known that

newborns' skin, including the umbilical stump, is colonized by microorganisms soon after birth [1,6]. These microorganisms include both pathogenic and non-pathogenic species. The profile of microorganisms colonizing the cord stump varies according to hygienic conditions at the time of birth and immediate postpartum period. In high-resource settings, likely microorganisms are gram positive ones (i.e. Streptococcal species and *Staphylococcus aureus*); while in low resource-community settings, gram negative microorganisms seem more prevalent (i.e. *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* and *Pseudomonas* spp) [1,6].

Omphalitis is a severe infection of the entire umbilical stump and surrounding skin. It initially presents itself as superficial cellulitis, but it can spread out to the entire abdominal wall and evolve into necrotizing fasciitis, myonecrosis and moreover into septicaemia, if tracking of bacteria along the umbilical vessels takes place [7,1].

Nevertheless, delay of the umbilical stump's separation time beyond 3 to 4 weeks of age, becomes a matter of concern for many pediatricians, because it can be associated with type 1 Leukocyte Adhesion Deficiency (LAD-1), a very rare and severe autoimmune, autosomal recessive disorder, which causes reduced neutrophil mobility and recurrent serious bacterial infections [8]. Yet, since the disorder was identified more than 30 years ago, as reported in the latest edition (6th) of the *Textbook of Pediatric Infectious Diseases* [9], it has worldwide been diagnosed only in about 150 individuals, besides having a broad ethnic diversity.

Moreover, some pediatricians discuss that the longer the umbilical stump takes to fall, the higher the risk of secondary infection.

Finally, mothers too are often concerned about the fall of the stump after discharge.

Hence, home care of the umbilical stump is effective not only to prevent mortality and morbidity due to neonatal bacterial infection, but also to reduce maternal stress [10].

3. UMBILICAL CORD CARE OPTIONS

Up to date, the most used treatment options for umbilical stump care are [11]

3.1 Triple Dye

(brilliant green, proflavinehemisulfate, and crystal violet). It is thought to be one of the most effective agents for bacteriocidal prophylaxis (especially for *S. aureus*); yet, arguably, it also might promote gram-negative bacteria colonization. One or two applications didn't prove to be toxic.

3.2 Isopropyl Alcohol

Of all agents it might have the least antibacterial activity.

It may cause peri-umbilical skin irritation and even though it does dry up the foul discharge associated with non-treatment of the stump, it has proved to prolong umbilical stump's separation time. Besides, it could cause alcohol intoxication and subsequent acidosis and hypoglycemia, in case of heavy exposure or occlusive dressing. Finally, many parents don't know how to apply alcohol properly onto the base of the umbilical stump [4].

3.3 Povidonolodine

It has proved to be less effective than triple dye in preventing both colonization and infection. It can cause iodine toxicity and transient hypothyroidism, especially in low birth weight infants, in whom plasma iodide levels may increase up to 400% for nearly 3 days [12].

3.4 Topical Antibiotics

(e.g. neomycin, bacitracin). They may increase bacterial antibiotic resistance and later also antibiotic hyper-sensitivity: triple dye has proved to be superior to other treatments in preventing both bacterial colonization and secondary infections.

3.5 Chlorhexidine

It has an effective antimicrobial broad spectrum, particularly against cord colonization with *S. aureus* and in underdeveloped countries it has been demonstrated to reduce significantly mortality from omphalitis [6]. Optimum dosage is still uncertain and more studies are needed, but it is safe, inexpensive and requires minimum training and skills [13,1]. Yet, some studies conducted recently suggest it might increase bacterial resistance, when used frequently [14].

When applied, occlusion must be avoided; besides, local skin reactions might occur.

3.6 Salicylic Sugar Powder

A powder formulation that different studies, conducted in developed countries, have shown reduces both rates of colonization and cord separation time much more than natural drying, alcohol and other methods [15,16].

3.7 Arnica/Echinacea Powder

Another safe powder formulation that we compared with natural drying, alcohol and other cord treatments: it allows the umbilical cord to fall in a much shorter time than all the other methods [17].

4. OBJECTIVES

In the Verbano-Cusio-Ossola district (Italy), we evaluated how safe it was to treat neonates' umbilical stumps with arnica/ echinacea powder, both in hospital settings and at home.

5. MATERIALS AND METHODS

In order to evaluate how safe it is to treat the umbilical cord with arnica / echinacea powder, we recently studied the umbilical stumps of 5450 consecutive neonates, born at the Hospitals of both Domodossola and Verbania (North-West Italy), from January the 1st, 2008 to June the 30th, 2014. During hospitalization (2 to 4 days), the umbilical cord was treated twice daily with arnica/echinacea powder and the stump was wrapped in sterile gauze. When discharged, the mother was taught to do the same things, till the stump fell off and then to continue treating the umbilical scar with arnica/echinacea powder and covering it with sterile gauze, for at least three days after. In order to monitor possible problems, forty eight hours after hospital discharge all infants were examined by a paediatric nurse in hospital and when fifteen days old, by the family paediatrician.

6. RESULTS

Average time for the cord to fall was 4 days (+ - 1.2 SD). Ninety-five cases (1.74%) had a problem: 74 infants, at 15 days of life, presented with a secreting umbilical scar, which required silver nitrate pencil dressing; 16 cases presented with a small umbilical granuloma, which resolved

spontaneously after a few months; 2 cases presented with minor bleeding. Two other cases presented with periumbilical pustules (i.e. *Staphylococcus aureus*) and 1 with supra-umbilical skin infection: all were treated with topical antibiotic.

7. DISCUSSION

Since 1998, the World Health Organization recommends using routinely dry umbilical cord care (i.e. keeping the cord clean without applying antiseptics and leaving it simply exposed to air or just loosely covered with a clean cloth; and when soiled cleaning it with water) and resorting to topical antiseptics (chlorhexidine) where hygienic conditions are poor and/or infection rates are high [18].

The WHO cord care recommendations, recently reconfirmed, at present are observed in developed countries (at birth and after discharge from hospital).

A Cochrane review published in July 2004, found that neonatal mortality and rates of disseminated or localized infection didn't benefit more from applying to the umbilical stump antiseptics or antibiotics, rather than leaving it dry naturally [19]. Yet, of all the included studies, most [18,19] were produced by high-income countries and all but one, were made in hospital settings. Hence, the findings of this Cochrane review may not be addressed to low-income developing countries [18].

The latest Cochrane review [1] evaluated the effects of applying antimicrobials on a newborn's umbilical stump, versus routine care, for preventing morbidity and mortality in hospital and community settings, of both developed and developing countries.

Among the analyzed 34 trials, three of them were large, cluster-randomized trials conducted in community settings in developing countries, while 31 studies were carried out in hospital settings, mostly in developed countries. The three trials, which were conducted in community settings, represented 78% of the patients included in this Cochrane review.

The majority of the trials that were produced in hospital settings, instead, had small sample sizes. Across all the included trials, twenty-two different interventions were studied and the most commonly antiseptic evaluated for the umbilical

stump's care, were chlorhexidine, 70% alcohol and triple dye. In community settings only one antiseptic, chlorhexidine, was analyzed: combined results of the three community trials showed in the chlorhexidine group, compared with the control group, a 23% reduction in all-cause mortality and, depending on the severity of the infection, a reduction in omphalitis ranging from 27% to 56%. Compared with dry cord care, cord separation time in the chlorhexidine group increased by 1.7 days (mean difference (MD) 1,75 days). Moreover washing of the umbilical cord with soap and water, compared with dry cord care, was of no advantage in community settings.

Among all the studies produced in hospital settings, no study reported data for mortality or tetanus and no antiseptic reduced the incidence of omphalitis compared with dry cord care.

Staphylococcus aureus colonization was reduced by topical triple dye application, compared with dry cord care or alcohol application. Applying alcohol and triple dye didn't reduce colonization with *Streptococcus*. Topical alcohol application compared with dry cord care, instead, reduced colonization with *Escherichia coli*; whereas in a separate analysis, triple dye compared with alcohol, increased the risk of colonization. Cord separation time, in hospital settings, increased significantly with topical application of alcohol (MD 1,76 days) and triple dye (MD 4,10 days), compared with dry cord care [1].

Hence, the authors conclude that in community and primary care settings in developing countries, topical application of chlorhexidine to the umbilical stump reduces neonatal mortality and omphalitis. Even though, applying chlorhexidine to the umbilical stump might prolong separation time, there is no evidence it increases risk of subsequent infection or morbidity.

In hospital settings in developed countries, instead, applying an antiseptic to the umbilical stump rather than resorting to dry cord care, is not supported by sufficient evidence [1].

Moreover, two other studies evaluated prospectively over 15,000 neonates with treated umbilical stumps and showed that delayed cord separation, when compared with dry cord care, is not associated with an increased risk of infection, [6,2].

Other studies have evaluated the effect of powder formulations in the umbilical cord care, such as salicylic sugar powder and arnica /echinacea powder.

In one study evaluating the effect of eight cord-care treatments [16], salicylic sugar powder was found to allow early cord detachment (cord separation time 5.6 +/- 2,3 days), resulting also in excellent parent treatment compliance and reducing their concern, despite a higher percentage of bleeding. Moreover, the rate of positive umbilical swabs proved to be low and significantly higher, only than the results obtained with neomycin-bacitracin powder treatment [16].

Another study [15] instead, compared the effectiveness of alcohol, natural drying and salicylic powder on the umbilical stump's separation time in a high-humidity country and found that the group of neonates treated with salicylic powder had the lowest rates of colonization and shortest cord separation time, compared with the natural drying and alcohol groups.

As regards arnica / echinacea powder, a natural compound (Fig. 1) available on the market, in one study Guala et al. [17]. compared the efficacy of it to other methods of treatment of the umbilical stump: the study showed that the stump took less time to fall when using micronized-benzyl-peroxide powder or micronized-benzyl-peroxide spray (8+/-4 days, 9+/-days respectively), compared with alcohol (14+/-6 days) and dry cord care (12+/-5 days), but even less when using arnica/echinacea powder [17]. These results were recently confirmed by Perrone et al. [20] in 6323 infants: in 89.09% of the cases, detachment occurred in the first 4 days of life and in 96.13% within 6 days, using arnica/echinacea powder-(4+/-1 days) [20]. The authors reported no cases of omphalitis or other serious side effects; mild bleeding occurred in 2.56% of cases at the time of separation.



Fig. 1. Arnica montana flower

In this last study of ours, we demonstrate that the entity of possible problems occurring while treating neonates' umbilical stumps with arnica/Echinacea powder, both during the first few days of life in a hospital setting and at home, is minimum.

8. CONCLUSION

Hence we conclude that arnica / echinacea powder is not only an efficacious but also a safe method of treating the umbilical stump both during hospitalization and at home, in developed countries: it allows the umbilical cord to fall in a much shorter time than all other methods, besides being easy to use both by nurses and parents.

ACKNOWLEDGEMENTS

This paper is not under review in any other journal.

The authors are very grateful to Mrs. Mary Coduri for linguistic consultation.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Imdad A, Bautista RM, Senen Ka, Uy ME, Mantaring JB, Bhutta ZA. Umbilical cord antiseptics for preventing sepsis and death among newborn. *Cochrane Database Syst Rev.* 2013;31:5.
2. Novack AH, Mueller B, Ochs H. Umbilical cord separation in the normal newborn. *Am J Dis Child.* 1988;142:220-3.
3. Oudesluys-Murphy AM, Eilers GA, de Grott CJ. The time of separation of the umbilical cord. *Eur J Pediatr.* 1987;146:387-9.
4. Stan L. Block. Stumped' by the newborn umbilical cord. *Pediatric Annals.* 2012;10:400-403.

5. Verber IG, Pagan FS. What cord care-if any? Arch Dis Child. 1993;68:594-6.
6. Mullany LC, Saha SK, Shah R, et al. Impact of 4.0% chlorhexidine cord cleansing on the bacteriologic profile of the newborn umbilical stump in rural Sylhet District, Bangladesh: A community-based, cluster-randomized trial. Pediatr Infect Dis J. 2012;31:444-450.
7. Brien JH. An 18-month-old female presents with fever, erythema, swelling around umbilicus. Infectious Diseases in Children. 2012;2:18-19.
8. Hayward AR, Harvey BA, Leonard J, Greenwood MC, Wood CB, Soothill JF. Delayed separation of the umbilical cord, widespread infections, and defective neutrophil mobility. Lancet. 1979;1:1099-1101.
9. Feigin R, Cherry J, Demmler-Harrison G, Kaplan S. Feigin and Cherry's Textbook of Pediatric Infectious Diseases. 6th ed. Philadelphia: WB Saunders; 2009.
10. Anhalt H, Marino RV, Rosenfeld W. Retained umbilical stump: Clinical approaches and separation anxiety. Am J Dis Child. 1992;146:1413-4.
11. Janssen PA, Selwood BL, Dobson SR, Peacock D, Thiessen PN. To dye or not to dye: A randomized, clinical trial of a triple dye/alcohol regime versus dry cord care. Pediatrics. 2003;111:15-20.
12. Pyati SP, Ramamurthy RS, Krauss MT, Pildes RS. Absorption of iodine in the neonate following topical use of povidone iodine. J Pediatr. 1977;91:825-828.
13. Goldenberg RL, McClure EM, Saleem S. A review of studies with chlorhexidine applied directly to the umbilical cord. Am J Perinatol. 2013;30:699-701.
14. Batra R, Cooper BS, Whiteley C, Patel AK, Wyncoll D, Edgeworth JD. Efficacy and limitation of a chlorhexidine-based decolonization strategy in preventing transmission of methicillin-resistant *Staphylococcus aureus* in an intensive care unit. Clin Infect Dis. 2010;50:210-217.
15. Liu MF, Lee TY, Kuo YL, Lien MC. Comparative effects of using alcohol, natural drying, and salicylic sugar powder on umbilical stump detachment of neonates. J Perinat Neonat Nurs. 2012;26:269-274.
16. Pezzati M, Biagioli EC, Martelli E, Gambi B, Biagiotti R, Rubaltelli FF. Umbilical cord care: The effect of eight different cord-care regimens on cord separation time and other outcomes. Biol Neonate. 2002;81:38-44.
17. Guala A, Pastore G, Garipoli V, Agosti M, Vitali M, Bona G. The time of umbilical cord care separation in healthy full-term newborns: A controlled clinical trial of different cord care practices. Eur J Ped. 2003;162:350-1.
18. Karumbi J, Mulaku M, Aluvaala J, English M, Opiyo N. Topical Umbilical Cord Care for Prevention of Infection and Neonatal Mortality. Pediatric Infect Dis J. 2013;32:78-83.
19. Zupan J, Garner P, Omari AA. Topical umbilical cord care at birth. Cochrane Database Syst Rev; 2004. CD001057.
20. Perrone S, Copi S, Coviello C, Cecchi S, Becucci E, Tataranno ML, Buonocore G. Efficacy of arnica echinacea powder in umbilical cord care in a large cohort study. J Matern Fetal Neonatal Med. 2012;25:1111-13.

© 2015 Scurati-Manzoni et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sciencedomain.org/review-history.php?iid=752&id=22&aid=7807>