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SPECIAL ARTICLE

Recommendations for the care of the umbilical cord in the newborn☆

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Abstract The care of the umbilical cord until its detachment still remains controversial. The latest updated recommendations by the World Health Organisation advocate dry cord care in those countries with adequate obstetric care and low neonatal mortality rate. In recent years, new studies and reviews attribute some benefit to applying chlorhexidine on the umbilical stump. An analysis is presented here of the available evidence and results in the advisability of still recommending the dry cord care in the newborns in our setting.

PALABRAS CLAVE
Cordón umbilical;
Clorhexidina;
Onfalitis;

Recomendaciones para el cuidado del cordón umbilical en el recién nacido

Resumen El cuidado del cordón umbilical hasta su desprendimiento continúa siendo motivo de controversia en la actualidad. La Organización Mundial de la Salud recomienda en su última revisión realizar la cura en seco en países con cuidados obstétricos adecuados y una tasa baja de

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Mortalidad neonatal;
Sepsis

mortalidad neonatal. Por otro lado, en los últimos años han surgido nuevos estudios y revisiones que atribuyen un beneficio a aplicar clorhexidina tópica en el muñón. El presente documento analiza la evidencia disponible y concluye en la conveniencia de continuar recomendando la cura en seco en los nacimientos de nuestro entorno.

Introduction

In 2009, the Standards Committee of the Sociedad Española de Neonatología (Spanish Society of Neonatology) published its guidelines for the care and management of newborns during delivery and the first hours post birth. Among the recommended measures, they proposed natural drying of the umbilical cord in environments with adequate hygiene with a grade B strength of recommendation.[1]

In recent years, new studies have addressed the question of which is the most suitable approach to umbilical cord care. This document of the Standards Committee of the Sociedad Española de Neonatología analyses the evidence currently available and updates the Society's recommendations based on this evidence.

Methods

We conducted a systematic review identifying articles by means of keyword and free-text searches in Medline and ISI Web of Knowledge.

We assessed the quality of evidence and determined the strength of each recommendation based on the criteria established by the *Center for Evidence-Based Medicine* and the guidelines of the *Canadian Task Force on Preventive Health Care* (Table 1).[2]

Justification and relevance of the subject

The umbilical cord is clamped after birth. This separates the circulations of mother and newborn and prevents bleeding. The cord is subsequently cut with a sterile instrument, leaving an exposed stump. The remaining cord detaches at about 7 days post birth after a period of progressive drying and atrophy. This process is influenced by exposure to ambient air, degradation mediated by phagocytic cells and colonization by exogenous bacteria.[3]

The withering tissue of the stump provides a suitable environment for bacterial colonization and growth, and colonization by pathogenic bacteria may lead to the development of omphalitis. The aetiological agent most frequently involved in these cases is *Staphylococcus aureus*, followed by the bacteria present in the birth canal. Omphalitis may become complicated with development of cellulitis, necrotizing fasciitis or systemic infection, which may threaten the life of the newborn.[4]

The incidence of omphalitis varies significantly depending on the level of hygiene in the environment of the newborn and the care provided. Thus, in low-income countries this adverse event may develop in up to 22% of newborns delivered at home, and the severity of the infections also tends to be greater.[5] In countries with greater resources, the incidence is much lower. The figures reported in the literature range between 0.1% and 2%,[6,7] a heterogeneity that can be partly attributed to differences in the applied definition of omphalitis. In any case, severe forms are very rare in our region.[8]

There are other complications related to the healing of the umbilical cord stump whose incidence may vary based on the approach to cord care. These include bleeding, granuloma, delayed cord separation and the development of secretions. The latter can give rise to anxiety in the caregiver, additional health care visits and the need for related treatments.[9]

Since 1998, the World Health Organization (WHO) has recommended dry cord care.[10] The recommendations of the WHO were last updated in 2013[11] and have been endorsed by other organizations at the international level, such as the National Institute for Health and Care Excellence[12] and the American Academy of Pediatrics.[4] However, survey-based studies in countries neighboring Spain have highlighted a significant variability in the recommendations given to families as regards umbilical cord care. These studies have also revealed a very frequent use of antiseptics.[13,14]

Strategies for the care of the umbilical cord

Dry cord care consists in the initial cleansing of the stump with tepid water and a neutral soap and then keeping the cord dry.[15,16] Additional measures have been proposed for this approach, such as covering the stump with clean gauze, exposing it to air by keeping it outside the diaper or avoiding its immersion in water,[17,18] but no studies of quality have yet been conducted that address these particular interventions.

Different antiseptics have been used with the aim of preventing infection of the navel. The two that have been studied most extensively are 70° alcohol and 4% chlorhexidine, administered in different dosage forms (alcoholic or aqueous solution, gel or powder). Other antiseptics used for the purpose are triple dye (a combination of 3 disinfectant solutions frequently used in the United States), povidone–iodine and salicylic acid, among others.[18–20]

Table 1 Grades for recommendations for specific clinical preventive actions.

A. There is good evidence to recommend the clinical preventive action
B. There is fair evidence to recommend the clinical preventive action
C. The existing evidence is conflictive and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
D. There is fair evidence to recommend against the clinical preventive action
E. There is good evidence to recommend against the clinical preventive action
F. There is insufficient evidence to make a recommendation; however, other factors may influence decision-making

Source: Canadian Task Force on Preventive Health Care.[2]

Topical antibiotics such as silver sulfadiazine, tetracyclines or neomycin have also been used.[19,21]

Finally, the literature describes other methods that are used less frequently, some based on traditional customs, such as mixtures of herbs, ash, breast milk or oils from different sources. Such practices are common in geographical regions like Asia and Africa, and some of them may carry an increased risk of infection by *Clostridium tetani*.[20,22]

Analysis of the current evidence

In 2004, the Cochrane Review published a first systematic review including the studies available to date on the subject of umbilical cord care. It analyzed 21 studies, most conducted in developed countries, that had compared dry cord care with alternative approaches such as alcohol, chlorhexidine, silver sulfadiazine or triple dye. This review concluded that the use of antiseptics or antibiotics did not achieve a reduction in the risk of omphalitis but was associated with an increase in the time it took the cord to detach.[21]

One of the limitations acknowledged in this first systematic review was the lack of studies conducted in lower-income countries. In 2013, Imdad et al. published an update that added 13 new studies, 10 of which conducted in developing Asian countries.[23] This updated review found a significant decrease in mortality and in the incidence of omphalitis with the use of chlorhexidine in low-income countries. However, this effect did not extend to more developed countries. In the same year, 2 other meta-analyses were published, reporting similar findings.[20,24]

In the past 5 years, another 3 systematic reviews have been published that focused on the potential advantages of the use of chlorhexidine compared to dry cord care.[3,25,26] These reviews have included a total of 14 studies with data from 86 308 newborns. Of these studies, only 3 (corresponding to 1.7% of total participants) were conducted in high-income countries. The conclusions of all of them are similar: the use of chlorhexidine is associated with a reduction in the incidence of omphalitis in low-income countries. In addition, this effect is greater in home births, and is associated with a decrease in neonatal mortality. When it came to high-income countries, the reviews did not find sufficient evidence to justify this intervention.

These last systematic reviews were followed by the publication of 2 new clinical trials comparing different umbilical cord care strategies in middle- to high-income countries. In Turkey, Ozdemir et al. compared dry cord care with the use of 70% alcohol, 4% chlorhexidine and povidone–iodine. The time elapsed to cord detachment was longer in patients that received an antiseptic, and there were no differences in the incidence of omphalitis.[18] In France, Gras-Le Guen et al. conducted a prospective, multicentre cross-over study that evaluated the effects of different antiseptics, including alcohol and chlorhexidine, to dry cord care. Dry cord care was proven noninferior to the use of antiseptics for prevention of omphalitis. The median time elapsed to umbilical cord detachment was 1 day shorter with dry cord care.

When it comes to inpatient umbilical cord care in newborns that require hospitalization, the published evidence is scarce. In 2004, Evens et al. included 109 preterm newborns delivered before 34 weeks' gestation in a clinical trial in the United States comparing dry cord care with the use of 70% alcohol. They found a significant delay in the detachment of the cord in the alcohol group and no difference between groups in the incidence of infection.[27] In 2013, Gathwala et al. published the results of a clinical trial conducted in India that compared the use of 2.5% chlorhexidine with dry cord care. The sample included 140 newborns delivered after 32 weeks' gestation that were hospitalised for more than 5 days. They found a lower incidence of confirmed sepsis and earlier cord detachment in the group treated with chlorhexidine. However, they found no differences in the results of culture of stump secretions between the two interventions.[28]

Discussion

Infections continue to be the main cause of child mortality worldwide. Among them, omphalitis is a public health problem in resource-poor countries, where the incidence is higher.[3] For this reason, umbilical cord care continues to be an active subject in scientific research. Furthermore, there is still substantial disagreement in the recommendations made by health providers to caregivers for umbilical cord care. These recommendations are often based on custom or personal beliefs and not supported by evidence.[21]

Among the alternatives to dry cord care, the use of chlorhexidine has become increasingly important in recent years. It decreases bacterial colonization of the stump,[18,21] and recent studies have demonstrated that this is associated with a reduction in the incidence of omphalitis in areas where this complication is common. In regions with poor hygiene and sanitation and with high proportions of home births, this effect is associated with a reduction in mortality.[3,25,26] This evidence led the World Health Organization to include the use of chlorhexidine in regions with

high neonatal mortality and high proportions of home births in their updated recommendations published in 2013.[11] Notwithstanding, clinical trials conducted in countries with greater resources have failed to find evidence of this positive effect. In these countries, better perinatal care results in a very low incidence of omphalitis, and in this context the antiseptic effect of chlorhexidine does not result in a relevant clinical benefit.

Other aspects need to be taken into account when considering the recommendations for the use of chlorhexidine. Bacterial colonization of the umbilical cord plays a part in its detachment, and reducing colonization interferes with this process and may delay the separation.[18] There is also a risk that such an intervention could result in the selection of more invasive microorganisms.[4] Another important aspect is that there is no certainty that these products are entirely harmless. Leaving aside the risk of irritating the exposed skin, there is evidence that they can be absorbed into the systemic circulation, and the potential toxic effects of this events are hereto unknown.[29] To these concerns we must add the greater economic cost of this intervention compared to dry cord care.[8] Finally, when it comes caregivers, the administration of chlorhexidine does not provide greater reassurance and is not perceived as being easier to implement compared to dry cord care.[8] Therefore, it seems reasonable to restrict the use of chlorhexidine to circumstances in which it is truly indicated.

Recommendations

- Dry cord care continues to be the most appropriate approach in regions like Spain, with a low incidence of omphalitis (Grade B recommendation).
- Routine use of chlorhexidine is indicated in regions or settings with a high incidence of omphalitis and associated neonatal death (Grade A recommendation).
- In newborns required a prolonged hospital stay, there is no evidence supporting the routine use of antiseptics in terms of their safety or efficacy (Grade C recommendation).

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Sánchez Luna M, Pallás Alonso CR, Botet Mussons F, Echániz Urcelay I, Castro Conde JR, Narbona E. Recomendaciones para el cuidado y atención del recién nacido sano en el parto y en las primeras horas después del nacimiento. An Pediatr (Barc). 2009;71:349–61.
2. Care CTF on PH. New grades for recommendations from the Canadian Task Force on Preventive Health Care. Can Med Assoc J. 2003;169:207–8.
3. Shariff JA, Lee KC, Leyton A, Abdalal S. Neonatal mortality and topical application of chlorhexidine on umbilical cord stump: a meta-analysis of randomized control trials. Public Health. 2016;139 Suppl. C:27–35.
4. Stewart D, Benitz W, Newborn C. Umbilical cord care in the newborn infant. Pediatrics. 2016;138:e20162149.
5. Mir F, Tikmani SS, Shakoor S, Warraich HJ, Sultana S, Ali SA, et al. Incidence and etiology of omphalitis in Pakistan: a community-based cohort study. J Infect Dev Ctries. 2011;5:828–33.
6. 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.
7. Brook I. Cutaneous and subcutaneous infections in newborns due to anaerobic bacteria. J Perinat Med. 2005;30:197–208.
8. Gras-Le Guen C, Caille A, Launay E, Boscher C, Godon N, Savagner C, et al. Dry care versus antiseptics for umbilical cord care: a cluster randomized trial. Pediatrics. 2017;139:e20161857.
9. Kapellen TM, Gebauer CM, Brosteanu O, Labitzke B, Vogtmann C, Kiess W. Higher rate of cord-related adverse events in neonates with dry umbilical cord care compared to chlorhexidine powder. Neonatology. 2009;96:13–8.
10. World Health Organization. Care of the umbilical cord: a review of the evidence. Geneva, Switzerland: World Health Organization; 1998.
11. WHO Recommendations on Postnatal Care of the Mother and Newborn [Internet]. Geneva, Switzerland: WHO Press; 2014.
12. National Institute of Health Care and Excellence. NICE guidelines: postnatal care up to 8 weeks after birth, physical health and well being (1.4.2.4). Available from: www.nice.org.uk/guidance/cg37 [accessed 27.11.18].
13. Nosan G, Paro-Panjan D. Umbilical cord care: national survey, literature review and recommendations. J Matern Fetal Neonatal Med. 2017;30:1655–8.
14. Lacour JP, Castanet J, Boutté P, Ortonne JP. Antiseptic treatment of the umbilical cord in newborns: survey and recommendations. Arch Pediatr. 1999;6:631–4.
15. Mugford M, Somchiwong M, Waterhouse IL. Treatment of umbilical cords: a randomised trial to assess the effect of treatment methods on the work of midwives. Midwifery. 1986;2:177–86.
16. Dore S, Buchan D, Coulas S, Hamber L, Stewart M, Cowan D, et al. Alcohol versus natural drying for newborn cord care. J Obstet Gynecol Neonatal Nurs. 1998;27:621–7.
17. American Academy of Pediatrics. Umbilical cord care. Available from: www.healthychildren.org/English/ages-stages/baby/bathing-skin-care/Pages/Umbilical-Cord-Care.aspx [accessed 27.11.18].
18. Ozdemir H, Bilgen H, Topuzoglu A, Coskun S, Soyletir G, Bakir M, et al. Impact of different antiseptics on umbilical cord colonization and cord separation time. J Infect Dev Ctries. 2017;11:152–7.
19. 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.
20. Karumbi J, Mulaku M, Aluvaala J, English M, Opiyo N. Topical umbilical cord care for prevention of infection and neonatal mortality. Pediatr Infect Dis J. 2013;32:78–83.
21. Zupan J, Garner P, Omari AA. Topical umbilical cord care at birth. Cochrane Database Syst Rev. 2004:CD001057.
22. Coffey PS, Brown SC. Umbilical cord-care practices in low- and middle-income countries: a systematic review. BMC Pregnancy Childbirth. 2017;17:68.
23. Imdad A, Bautista RMM, Senen KAA, Uy MEV, Mantaring JB 3rd, Bhutta ZA. Umbilical cord antiseptics for preventing sepsis and death among newborns. Cochrane Database Syst Rev. 2013. CD008635.
24. Imdad A, Mullany LC, Baqui AH, El Arifeen S, Tielsch JM, Khatry SK, et al. The effect of umbilical cord cleansing with chlorhexidine on omphalitis and neonatal mortality in community settings in developing countries: a meta-analysis. BMC Public Health. 2013;13 Suppl. 3:S15.

25. Sankar MJ, Chandrasekaran A, Ravindranath A, Agarwal R, Paul VK. Umbilical cord cleansing with chlorhexidine in neonates: a systematic review. J Perinatol. 2016;36 Suppl. 1:S12.
26. Sinha A, Sazawal S, Pradhan A, Ramji S, Opiyo N. Chlorhexidine skin or cord care for prevention of mortality and infections in neonates. Cochrane Database Syst Rev. 2015. CD007835.
27. Evens K, George J, Angst D, Schweig L. Does umbilical cord care in preterm infants influence cord bacterial colonization or detachment? J Perinatol. 2004;24:100–4.
28. Gathwala G, Sharma D, Bhakhri B. Effect of topical application of chlorhexidine for umbilical cord care in comparison with conventional dry cord care on the risk of neonatal sepsis: a randomized controlled trial. J Trop Pediatr. 2013;59:209–13.
29. Chapman A, Aucott S, Milstone A. Safety of chlorhexidine gluconate used for skin antisepsis in the preterm infant. J Perinatol. 2011;32:4–9.