

Outcomes and Cost Analysis of Salt Therapy Versus Silver Nitrate for Treatment of Umbilical Granuloma: 4-Years Experience in a Private Health Centre

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Received: May 28, 2018; **Published:** June 21, 2018

Abstract

Background: Salt therapy is not yet unanimously considered the “gold standard” in the treatment of umbilical granuloma compared to silver nitrate therapy. This study aimed to compare outcomes and cost of salt therapy and silver nitrate therapy in private health care center.

Methods: A retrospective analysis of 325 patients, 1 to 24 months of age who underwent treatment of umbilical granuloma at the Luvkush Polyclinic Center and Annapurna Children and Women's Hospital, Nepal from January 2014 to December 2017 was performed. The variables analyzed included patients data (age, gender), complications, recovery time and total costs. Participants were monitored at the end of 1 week, 1 month and 6 months.

Results: Salt therapy was performed in 180 patients, silver nitrate in 145. Total 27 cases (8.3%) underwent electric cauterization that was not responded to salt therapy and silver nitrate therapy. The complication rate was 19% and 4% in the silver nitrate group and in the salt group respectively. In the salt therapy group 95% improved without surgery; 9 patients were operated after a week whereas 12.41% needed surgery in the silver nitrate group. The recurrence rate was none in salt therapy whereas in the silver nitrate was 7% among the 127 patients treated during the 6 months follow-up.

Conclusion: Salt therapy is associated with minor complications and less recovery time and total costs, compared with silver nitrate. Therefore, salt therapy can be recommended as gold standard treatment method in umbilical granuloma.

Keywords: Umbilical Granuloma; Silver Nitrate; Common Salt Therapy; Electrocauterization

Abbreviation

UG: Umbilical Granuloma

Introduction

Umbilical Granuloma (UG) is the most common umbilical abnormality in neonates and infants causing inflammation and drainage, with a prevalence rate of 1 in 500 newborns [1]. It is not a congenital abnormality but represents continuing inflammation of granulation tissue that has not yet epithelialized [2].

At delivery, the umbilical cord is separated from the newborn, allowing an umbilical stump remaining which is separated by 4 weeks with mean time 15.0 ± 7.2 days [3]. Occasionally, following separation of the cord incomplete epithelialization may occur over the ring area and reddish granulation tissue appears which may overgrow in size and results UG that looks as small piece of pink to bright red, moist flesh remaining in the umbilicus. It contains no nerves and has no feeling [5]. The exact cause of UG is unknown [4], if not treated granuloma persists for a long time. No spontaneous resolution has been documented in the literature. Therefore, once the diagnosis is established, proper management and some type of therapy is needed for persistent granuloma [6].

The granuloma may ooze and persist for several months, and treatment is advocated to reduce the risk of umbilical infection [7]. Over the years, a number of interventions have been used, including dry care [8], applying chlorhexidine powder, breast milk, saline, ethyl alcohol or silver sulfadiazine [9], wiping with alcohol swabs [10,11], cryotherapy [12,13], ligation [14], excision [1], chemical cauterization with silver nitrate or copper sulphate, clobetasol propionate cream (0.05%), a group IV steroid and electric cauterization. Few randomized controlled trials have tested the efficacy of these treatments [11]. Among them the most common treatment is application of a 75% silver nitrate stick [1], usually repeated two to three times over a number of clinic visits. Silver nitrate acts as an antiseptic, astringent, or caustic agent, depending on the chemical concentration and duration of application. Contact of this substance with the moist granuloma triggers cauterization. Burns have been reported following spillage onto the surrounding tissues [15], perhaps related to movement of the struggling infant as the chemical is applied. Most umbilical granulomas are located relatively deep into the umbilical region and are difficult to locate spillage is more. Careful drying of the umbilical exudate to prevent spillage is essential in preventing staining of the skin or chemical burns. This regimen is time-consuming for parents as treatment is provided by professionals in the outpatient clinic to reduce side effects, such as skin burning and ulceration [10,15,16].

A few papers have been published on the application of common salt on umbilical granuloma. In 1972 Schmitt [17] in a very short note, describe the shrinking effect of common salt on umbilical granuloma. This observation has rarely made an appearance in subsequent medical literature. This study addresses the successful treatment of umbilical granuloma with common salt. In one study, it was shown that 2-hours treatment of neonate umbilical granulomas with salt was more effective than silver nitrate application [18]. Farhat, et al. had published the Comparison between Two and Twenty-four Hours Salt Powder in Treatment of Infant Umbilical Granuloma in 2008 [19]. Since every primary-care physician may encounter neonates with UG, clearer evidence of benefit is essential before advocating salt treatment.

In particular, there is no data comparing the cost difference between salt therapy and silver nitrate therapy in the local context. This is important, as cost analysis from foreign publications may not be applicable in our local setting as healthcare economics vary between countries. In the current era where healthcare resources are spread thinly nationwide, such data is crucial for us to determine the more cost effective technique for the treatment of a common pathology. We thus aim to perform a cost analysis and compare the clinical outcomes between salt therapy and silver nitrate therapy in the local setting.

Materials and Methods

This is a retrospective study that included all patients diagnosed with umbilical granuloma and treated in two medical centers between January 2014 and December 2017. All the patient's data were collected. A total of 325 patients met the inclusion criteria and were randomized to one of two intervention groups. Of these 325 patients both male and female completed the assigned treatment, 180 patients' umbilical granulomas with common salt in group I and 145 patients' umbilical granulomas with silver nitrate in group II. The inclusion criteria were an absence of infection at the umbilicus and no prior treatment of umbilical granuloma whereas the exclusion criteria were umbilical discharge with no outgrowth, patent vitelli-intestinal duct (VID), umbilical sinus, patent urachus and omphalitis. Written informed consent was obtained from the parents of each patient on follow up outpatient clinic prior to enrollment in both groups.

In group I, umbilicus were cleaned with povidone iodine solution and dried up with gauge piece. A pinch of table salt powder was kept inside umbilicus, around the granuloma peduncle and over the granuloma head. Salt was wrapped with cotton balls so that no salt was spilled outside umbilicus. Gauge piece was kept over the cotton balls followed by adhesive paper tape. Patients were advised to stay hospital for 1 hour. Salt powder was washed out using normal tap water. The procedure was repeated twice a day for three consecutive days. The results were recorded.

In group II, umbilical granulomas received standard treatment with 75% silver nitrate, which was applied twice a week at the pediatric outpatient clinic.

A systematic review of the patients’ medical records was done. In groups, the patients’ gestational age, sex, weight, follow up notes were recorded. Characteristics of the treatment were compared. At last, the follow up was compared (time of the follow up, recovery time, complications) along with the total expenditure in treatment.

Results

Among 325 patients, 180 patients were treated with common salt and 145 with 75% silver nitrate. The mean age was 6.1 (2 - 24) months. Table 1 shows Age distribution, table 2 shows sex distribution, table 3 shows sex distribution among each group, table 4 shows the response to treatment in each group and table 5 shows post treatment complication and reoccurrence between 2 groups.

Age group	Number of patients	Percentage
< 3 Months	72	22.15%
3 - 5 Months	167	51.38%
> 5 Months	86	26.46%

Table 1: Age Group distribution (n = 325).

Sex	Number of patients	Percentage
Male	187	57.54%
Female	138	42.46%

Table 2: Sex distribution (n = 325).

Sex	Group I	Group II
Male	105	82
Female	75	63

Table 3: Sex distribution among group I and group II (n = 325).

Response	Group I	%	Group II	%
Excellent response*	171	95%	127	91%
No response	9	5%	18	12.41%

Table 4: Comparison of response to treatment in the 2 groups at the end of 1st week.

* Excellent response = umbilicus returned normal

Post Treatment	Group I n = 171	%	Group II n = 127	%
Complication	7	4.09%	24	18.89%
Reoccurrence	0	-	9	7.08%

Table 5: Comparison of post treatment complication and reoccurrence in the 2 groups.

During the treatment in group I, the most common observation was the umbilical granuloma discharging cherry black secretion from the lesion on the first day of therapy which gradually shrunk, darkened, turned black, and dried, separated and gradual healing of the lesion was apparent within 3 days (Figure 1). One hundred seventy one (95%) patients of this group were cured by the aforementioned definition following 6 courses of therapy. Nine (5%) patients didn't respond to the salt therapy who underwent electrocauterisation after a week. Out of 145 patients only 127 patients responded well to silver nitrate whereas 18 (12.4%) didn't responded at all in group II. Those patients later underwent electrocauterisation under anesthesia. Total 27 (8.3%) patients were unresponsive to common salt and silver nitrate for the treatment due to misdiagnosed as granuloma for polyp. 17 neonates in the group I and 19 in the group II were pre-term. 22 and 17, of the granulomas in the group I and II were large in size respectively and the remained had a small size.

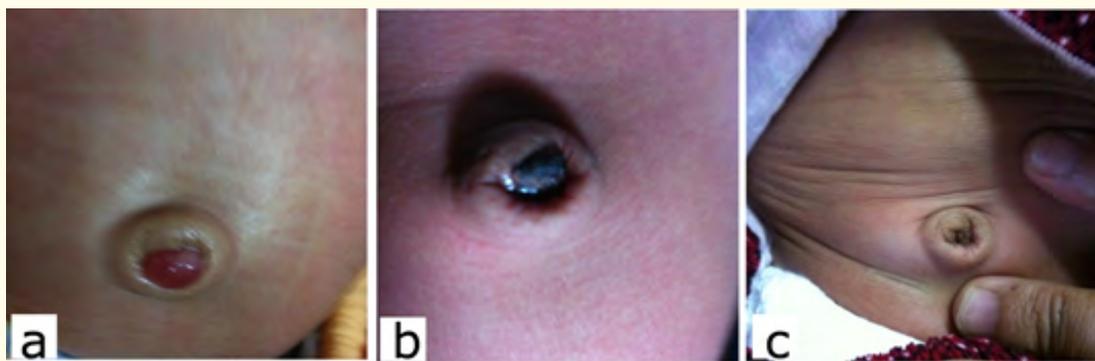


Figure 1: (a) Prior to treatment. (b) 2nd day of salt therapy. (c) Post 3rd day of salt therapy.

Patients had been followed-up for 3 different periods (1 week, 1 month and 6 months), and no major pathological changes of surrounding skin or recurrence was observed in group I. However mild bluish discoloration of umbilicus in-group I (salt therapy) were reported in 4% cases, all of which were self-cured on 2nd (1 month) follow-up without any treatment. Whereas minor burns and ulceration were reported in 19% cases around umbilicus (Figure 2) with 7% recurrence rate among the 127 patients treated during the 6 months follow-up in group II.



Figure 2: Post silver nitrate burn.

Cost Comparison

The cost in the silver nitrate was higher than that in the common salt therapy group (US\$43.50 ± 21.65 vs US\$22.45 ± 10.75).

Discussion

Granuloma formation is associated with delayed separation of the cord and persistent inflammation. In practice, however, topical antibiotics, such as mupirocin, rarely manage it successfully, which implies the inflammation that causes granuloma formation may be not due to pure bacterial infections. Thus, the antibiotic treatment is not the key point. Therefore, destructive treatments such as silver nitrate, ligation, electric cauterization, and surgery have developed, but there are some disadvantages with these managements.

Standard texts continue to recommend silver nitrate application for umbilical granuloma, and no alternative methods for primary treatment have been discussed in the English language literature. Cauterization with silver nitrate and copper sulphate may cause minor to major burn of periumbilical skin area which is painful [15]. However, it is also time consuming for parents due to multiple visits to the clinic. In contrast, the side effect of topical salt is mild and reversible and the treatment can be performed at home. The procedure is not painful, As well common salt is not an irritant to tissues, it has no burning effect on normal tissues. The baby cries because to being poked and uneasiness in the belly during application of salt.

Currently, electric cauterization or surgery is an option for those babies who failed previous noninvasive treatments [1]. These treatments are surgical removal of the granuloma under general anesthesia. A disadvantage is that it costs more than noninvasive treatments.

The natural regression of the untreated umbilical granuloma has not being documented [6]. So there is a research for an agent, which has a curative effect without any complication. In this situation common salt is a suitable agent for the treatment of umbilical granuloma. Common salt is potent, has no side effect, cost effective and easily available. Encouraged with the experience of others [16,19,21,22] we have also used common salt on our study population.

In our study, topical salt had a high response rate (100%) without recurrence. As mentioned above, the curative mechanism of salt on granuloma is through its desiccant effect and other biologic properties; the high concentration of sodium ion in the area draws water out of the cells and results in shrinkage and necrosis of the wet granulation tissue. These properties are speculated to be part of the therapeutic mechanisms involved in our study. However, this effect is not so powerful as to cause damage to normal surrounding keratinized skin when applied for short duration.

In a study conducted by Hossain., et al. [22] and Saleh, Abdullah [20] showed 100% excellent response to the common salt over UG with no adverse effects. In the first study 8.3% patients was unresponsive to table salt for the treatment due to misdiagnosed as granuloma for other pathologies.

In our study, the salt therapy of umbilical granuloma was more effective than silver nitrate treatment and no major complications or side effects were observed. In a similar study carried out in Hamedan, Iran by Farhat [18], it was shown that salt is effective for the treatment of umbilical granuloma. The agent can be conveniently performed by parents at home. Compared with silver nitrate treatment, the cost of salt therapy can be largely reduced.

The umbilical granuloma treated with common salt usually clears within 4 - days weeks. If a complete cure is not effected within this time surgical advice should be obtained [17]. In our study we found that umbilical granuloma is curable with table salt, which proves the commonest of others. We had no major complication. With the above findings our study addresses the successful treatment of umbilical granuloma with common salt.

Conclusion

In our study we compared the outcomes between topical silver nitrate therapy and salt therapy for treatment of umbilical granuloma. Our results show that common salt therapy is associated with minor complications and less recovery time, and total costs, compared with silver nitrate. Therefore, common salt therapy can be recommended as gold standard treatment method in umbilical granuloma.

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Bibliography

1. Nagar H. "Umbilical granuloma: a new approach to an old problem". *Pediatric Surgery International* 17.7 (2001): 513-514.
2. Pomeranz A. "Anomalies, Abnormalities and Care of the umbilicus". *Pediatric Clinics of North America* 51.3 (2004): 819-827.
3. Wilson CB. "When is umbilical cord separation delayed?" *Journal of Pediatrics* 107.2 (1985): 292-294.
4. *Annals of Tropical Paediatrics: International Child Health* 26.2 (2006): 133-135.
5. Wakefield M., *et al.* "Effect of feedback regarding urinary cotinine and brief tailored advice on home smoking restrictions among low-income parents of children with asthma: a controlled trial". *Preventive Medicine* 34.1 (2002): 58-65.
6. Vicente H. *Pediatric Surgery Update* 22.3 (2004): 65-66.
7. Snyder CL. "Current management of umbilical abnormalities and related anomalies". *Seminars in Pediatric Surgery* 16 (2007): 41-49.
8. Kapellen TM., *et al.* "Higher Rate of Cord-Related Adverse Events in Neonates with Dry Umbilical Cord Care Compared to Chlorhexidine Powder". *Neonatology* 96.1 (2009): 13-18.
9. Ahmadpour-Kacho M., *et al.* "The effect of tropical application of human milk, ethyl alcohol 96%, and silver sulfadiazine on umbilical cord separation time in newborn infants". *Archives of Iranian Medicine* 9 (2006): 33-38.
10. Daniels J. "Is silver nitrate the best agent for management of umbilical granulomas?" *Archives of Disease in Childhood* 85.5 (2001): 432.
11. Daniels J., *et al.* "Umbilical granulomas: a randomised controlled trial". *Archives of Disease in Childhood. Fetal and Neonatal Edition* 88.3 (2003): F257.
12. Sheth SS. "Cryosurgery-a new modality for the management of umbilical granuloma of newborn". *Indian Pediatrics* 18.12 (1981): 909-912.
13. Sheth SS and Malpani A. "The management of umbilical granulomas with cryocautery". *American Journal of Diseases of Children* 144.2 (1990): 146-147.
14. Lotan G., *et al.* "Double-ligature: a treatment for pedunculated umbilical granulomas in children". *American Family Physician* 65.10 (2002): 2067-2068.
15. Chamberlain JM., *et al.* "Silver nitrate burns following treatment for umbilical granuloma". *Pediatric Emergency Care* 8.1 (1992): 29-30.
16. Majjiga VS., *et al.* "Silver nitrate burns following umbilical granuloma treatment". *Archives of Disease in Childhood* 90.7 (2005): 674.

17. Schmitt BD. "Tip of the month, Shrinking umbilical granulomas". *Consultant* 12 (1972): 91.
18. Farhat AS. "Newborns umbilical granuloma treatment with salt". *Medical Journal of Mashhad* 43.67 (2000): 105-108.
19. Farhat Ahmadshah and Mohammadzadeh Ashraf. "Comparison between Two and Twenty-four Hours Salt Powder in Treatment of Infant Umbilical Granuloma". *Iranian Red Crescent Medical Journal* 10.4 (2008): 267-269.
20. Saleh Abdullah. "Therapeutic effect of common salt on umbilical granuloma in infants". *International Journal of Medical Science and Public Health* 5.5(2016): 911-914.
21. Derakhsan MR. "Curative effect of common salt on umbilical granuloma". *Irish Journal of Medical Science* 23 (1998): 132-133.
22. Hossain., *et al.* "Therapeutic Effect of Common Salt (Table/ Cooking Salt) on Umbilical Granuloma in Infants". *Bangladesh Journal of Child Health* 34.3 (2012): 99-102.

Volume 7 Issue 7 July 2018

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