

2-octyl cyanoacrylate hypospadias repair dressing: a retrospective, controlled comparison

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Introduction: 2-octyl cyanoacrylate (OC) has been shown to be a viable option for usage following standard circumcision but data on its utilization following hypospadias repair is limited. Both OC and a standard waterproof transparent dressing (WD) are used following hypospadias repair at our children's hospital. Our hypothesis is that patients with distal hypospadias repair using OC for surgical dressing have similar outcomes as compared to patients with WD.

Materials and methods: A retrospective study was performed evaluating all patients with distal hypospadias repair during a 2 year period. OC was primarily used by one of the three physicians in the practice with the other two primarily used WD for surgical dressing. The primary endpoints evaluated include hematoma requiring surgical drainage, infection, meatal stenosis, urethrocutaneous fistula, dehiscence, and diverticulum.

Standard follow up after hypospadias repair includes a 1 week follow up for patients requiring urethral stent removal and reevaluation for all patients 3-4 months after surgery. REDCap was used in order to compile the database used in this study.

Results: A total of 280 patients underwent distal hypospadias repair during this interval. One hundred twenty-two patients had OC used with 3 (2.4%) having complications: 2 fistulas and 1 with both meatal stenosis and fistula. One hundred fifty-eight patients were dressed with WD with 5 (3.2%) complications: 4 fistulas and 1 meatal stenosis. No patients had hematoma, wound dehiscence, diverticulum, or infection.

Conclusion: A low rate of complication was observed following distal hypospadias repair using both 2-octyl cyanoacrylate and a standard waterproof transparent dressing. 2-octyl cyanoacrylate is a safe option for surgical dressing following distal hypospadias repair but its utilization in this setting is surgeon dependent.

Key Words: 2-octyl cyanoacrylate, hypospadias repair

Introduction

Hypospadias is one of the most common congenital malformations in the United States ranging from

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0.3-0.7.¹⁻⁴ New techniques to correct this malformation are continuously developing, all of which require a postoperative dressing to protect the repair. When choosing an ideal postoperative dressing for hypospadias repair, the dressing should be easy to apply, potentially minimize edema, aid in hemostasis, and minimize exposure to bacteria and water. Many different types of hypospadias dressings have been described with no consensus on a single approach.

This study compares two methods of postoperative dressing for hypospadias repair: waterproof transparent dressing (WD) and 2-octyl cyanoacrylate (2-OCA). WD is a transparent skin dressing made of polyurethane with an adhesive side that is currently being used for wound care, surgical site protection, and securing and protecting an intravenous injection site.⁵ The advantages of the WD include its availability in multiple precut sizes, adhesiveness to irregular contours, its waterproof sterile nature, and its relative impermeability to liquids, bacteria, and viruses.⁶ 2-OCA emerged in 1997 as the finished product of many generations of cyanoacrylate skin adhesives.⁷ 2-OCA is applied to the wound edge where it dries in an exothermic reaction leading to the creation of a durable, formative bond. When tested against subcuticular sutures and staples, 2-OCA has demonstrated potential evidence of superiority in closure time, patient satisfaction, and cosmesis.^{8,9} 2-OCA was also shown to be bactericidal against common pathogens that cause surgical site infections and demonstrated a reduction in infection rates.¹⁰

Tan et al published favorable outcomes for utilization of 2-OCA with hypospadias repair, noting ease of application, low rates of wound dehiscence, and absence of infection.¹¹ However, this review was limited with only 37 patients reviewed and no control group. Hosseini et al also reported their experience with a small group of patients (20) after hypospadias surgery as compared to a control group of 41 patients having treated with a standard pressure dressing after hypospadias repair. Fewer hematomas (1) and skin infections (1) were noted in the 2-OCA group as compared to the standard pressure dressing group which had 7 hematomas and 5 skin infections. However, surgical outcomes of hypospadias repair were not reported in this study.¹²

In the urology service at our institution, the three pediatric urologists use different postoperative hypospadias dressing strategies with one using 2-OCA while the other two use WD following this procedure. With this study, we sought to compare the impact of these types of hypospadias dressings on both immediate postop results and the outcomes of hypospadias repair. Our hypothesis for this study is that patients with distal hypospadias repair using 2-OCA compared to patients with WD will have similar outcomes in both the immediate postoperative period and after healing of hypospadias repair.

Materials and methods

After receiving approval from the Institutional Review Board, our institutional hypospadias database

was queried for patients with a history of primary hypospadias repair for distal hypospadias during a 2 year period for this study. Distal hypospadias is categorized here as glanular, coronal, subcoronal, or distal shaft hypospadias. 2-OCA is a liquid cyanoacrylate that is applied liberally to the surgical site postoperatively. 2-OCA then dries, creating a water-resistant seal around the penis. WD is a breathable adhesive dressing that is wrapped around the surgical site. Utilization of 2-OCA was surgeon-specific with one surgeon primarily using this modality as a dressing. Each patient treated with 2-OCA typically had two applications of this product from a single vial before removing the penile holding suture. Variability was present in the usage of antibiotics preoperatively and postoperatively. Patients underwent follow up in the Urology clinic 5-10 days after surgery for stent removal, 3-4 months after surgery, and then after potty-training.

The two groups were compared for immediate postoperative outcomes with assessment for surgical site infection (SSI), postoperative hematoma, and skin dehiscence. SSI was defined as the presence of postoperative penile erythema and/or purulent drainage treated with therapeutic antibiotics. Hematoma was defined as any degree of postoperative hematoma requiring surgical drainage in the operating room. Skin dehiscence was defined as the separation of the skin incisions during the postoperative period.

The two groups also were compared for hypospadias repair outcomes as well. Variables assessed were the presence of postoperative meatal stenosis, urethral fistula, glanular dehiscence, and urethral diverticulum presenting at any point during the postoperative period.

The study database of patients was collected and managed using REDCap electronic data capture tools hosted at our institution. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.¹³

Results

There were 294 consecutive patients identified as having undergone distal penile hypospadias repair during this time period, and 280 patients had either 2-OCA or WD dressings, satisfying inclusion in this study. There

TABLE 1. Dressing distribution by meatus location

	2-OCA (n = 122)	WD (n = 158)	Total (n = 280)
Location of meatus			
Balanic	83 (64.3%)	46 (35.7%)	129
Distal	39 (25.8%)	112 (74.2%)	151
Procedure			
TIP & TIP with inlay	69 (37.7%)	114 (62.3%)	183
Non-TIP	53 (54.6%)	44 (45.4%)	97
Age (years)	1.2	1.1	

2-OCA = 2-octyl cyanoacrylate; WD = waterproof transparent dressing; TIP = tubularized incised plate hypospadias

were 122 patients dressed with 2-OCA and 158 patients dressed with WD. The majority of patients had distal penile hypospadias (53.9%), and the majority of patients underwent tubularized incised plate hypospadias (TIP) repair (65.4% (with TIP with inlay grafts included)), Table 1. The average age at the time of surgery was 1.2 (2-OCA) and 1.1 (WD) years, respectively.

Neither group was found to have postoperative hematomas requiring surgical drainage, wound dehiscence, or SSIs, Table 2. In the 2-OCA group, 3 (2.4%) hypospadias complications were observed: 2 fistulas and 1 with both meatal stenosis and fistula. In the WD group, 5 (3.2%) experienced hypospadias complications: 4 fistulas, and 1 meatal stenosis. None of the patients experienced urethral diverticulum.

Discussion

The use of 2-OCA has been explored in urological procedures such as circumcision where it has been shown to decrease cost and reduce operation time

when compared to traditional sutures.¹⁴ Reduced postoperative pain, improved cosmetic appearance and ease of care after circumcision also have been noted with 2-OCA after circumcision.¹⁵ Utilization of 2-OCA as a dressing beyond circumcision for the treatment of urethral fistulas has been explored as well. A randomized clinical trial published by Ambriz-Gonzalez et al compared the use of 2-OCA versus reoperation for closure of urethrocutaneous fistula that developed following hypospadias repair in 42 boys. The results from this trial demonstrated similar results when 2-OCA and operative reintervention was used for closure. The authors recommended a trial of 2-OCA before reoperation in management of urethrocutaneous fistulas because of the ease of application of 2-OCA in an outpatient, office setting, reduced cost, and minimal risk to the patient with reasonable success rates.¹⁶

In the current study, the comparable hypospadias complication outcomes between use of 2-OCA and WD show that either 2-OCA or WD are effective dressings for this procedure. The decision of which dressing

TABLE 2. Comparison of hypospadias complications

p value	2-octyl cyanoacrylate (n = 122)	waterproof transparent dressing (n = 158)
0.9572		
Hematoma	0	0
Surgical site infection	0	0
Wound dehiscence	0	0
Meatal stenosis	0	1 (0.65%)
Meatal stenosis + fistula	1 (0.84%)	0
Urethral diverticulum	0	0
Urethrocutaneous fistula	2 (1.69%)	4 (2.53%)

to use for hypospadias repair is ultimately a surgeon preference, but this trial demonstrates either 2-OCA or WD can be expected to perform similarly and with low complication rates. The strengths of 2-OCA as a dressing following hypospadias repair are its ability to control hemostasis, provide a barrier between the wound and surrounding urine or stool, and minimize edema, which is evidenced by the low complication rates comparable to WD in this study. It is possible that management of the postoperative wound with 2-OCA may be easier for the families than that of other dressings, although this has not been proven to our knowledge.

One of the strengths of this study is the large number of patients that were analyzed. This study included 280 total patients, 122 dressed with 2-OCA and 158 dressed with WD. There were 3 complications in patients dressed with 2-OCA with a rate of 2.4%, and there were 5 complications in patients dressed with WD with a rate of 3.2%. In a similar study, Hosseini et al reported a complication rate of 10% using 2-OCA following hypospadias repair, though there were only 20 patients in that study that were dressed with a cyanoacrylate adhesive. The major limitation with that study is the relatively small number of patients that were reported. The 2 complications reported with application of 2-OCA were wound hematoma and skin necrosis with superimposed infection, which are early complications from this procedure.¹² In our study, there were 8 total complications between both comparison groups. The complications we observed were meatal stenosis and urethrocuteaneous fistula, late complications that might seem to be less impacted by dressing choice. While these late complications of hypospadias repair may seem to be less directly related to the dressing type, we were concerned that unappreciated mild to moderate hematomas might increase the likelihood of such later complications. Fortunately, this did not seem to be the case. Also, the control group in the Hosseini et al study contained 41 patients who were dressed with a conventional dressing that consisted of a mixture of ointment-covered antibiotic gauze wrap and pressure dressing. The control group had a total complication rate of 30% with 7 incidents of wound hematoma and 5 incidents of surgical site infection. The significant reduction of complications with 2-OCA suggests relative benefit of 2-OCA to conventional gauze dressings (30% to 10%).¹² Our study confirms that 2-OCA and WD are equally safe and effective options to use and our immediate postoperative complication rates as that reported by the Hosseini et al study. These short term results coupled with comparable hypospadias repair correction outcomes suggests that 2-OCA may be more optimal than conventional gauze dressings.

Although this series expands upon what is known about usage of 2-OCA for hypospadias repair, we acknowledge that there are limitations of this study. First, this was a retrospective study where only one urologist used 2-OCA and two other urologists used only WD as postoperative dressings for a 2 year period, and there are inherent potential biases and limitations with data collection for any retrospective study. Also, the definition of hematoma is very conservative in this study with this being a rather subjective outcome to measure unless the patient requires reoperation for hematoma decompression. Furthermore, there is the possibility that these results may be influenced by the techniques and skill of each individual urologist rather the properties of the two dressing options. A randomized, prospective study would be useful to determine whether 2-OCA is truly equivalent if not superior to WD dressing for hypospadias repair. Such a prospective study would present the opportunity to study the patient or caregiver perspective on hypospadias dressing as well.

Conclusion

A low rate of complication for both immediate postoperative results and hypospadias repair outcomes were observed following distal hypospadias repair using 2-octyl cyanoacrylate as compared to a standard waterproof transparent dressing. 2-octyl cyanoacrylate is a safe option for surgical dressing following distal hypospadias repair. □

References

1. Baskin LS, Ebberts MB. Hypospadias: anatomy, etiology, and technique. *J Pediatr Surg* 2006;41(3):463-472.
2. Schaefer FJ, Holland AJ, Pereira G, Bower C, Nassar N. Prevalence, repairs and complications of hypospadias: an Australian population-based study. *Arch Dis Child* 2015;100(11):1038-1043.
3. Huang WY, Chen YF, Guo YJ et al. Epidemiology of hypospadias and treatment trends in Taiwan: a nationwide study. *J Urol* 2011; 185(4):1449-1454.
4. Abdullah NA, Pearce MS, Parker L, Wilkinson JR, Jaffray B, McNally RJ. Birth prevalence of cryptorchidism and hypospadias in northern England, 1993-2000. *Arch Dis Child* 2007;92(7):576-579.
5. Wong MM, Shah M, Kyle K, Feinberg EB. Skin protection using tegaderm in the postoperative eye patient. *Retina* 2012;32(8): 1670-1671.
6. Material Safety Data Sheet, Tegaderm™ Film Drape Dressing, 3M Corporation, St. Paul, MN, USA; https://multimedia.3m.com/mws/mediawebserver?mwsId=SSSSu9n_zu8l00x4xt958tBlv70k17zHvu9lxtD7xtBevSSSSSS- Issue date March 8, 2017. Accessed March 2, 2018.

7. Quinn J, Wells G, Sutcliffe T et al. A randomized trial comparing octylcyanoacrylate tissue adhesive and sutures in the management of lacerations. *JAMA* 1997;277(19):1527-1530.
8. Krishnamoorthy B, Najam O, Khan UA, Waterworth P, Fildes JE, Yonan N. Randomized prospective study comparing conventional subcuticular skin closure with Dermabond skin glue after saphenous vein harvesting. *Ann Thorac Surg* 2009;88(5):1445-1449.
9. Miller AG, Swank ML. Dermabond efficacy in total joint arthroplasty wounds. *Am J Orthop* 2010;39(10):476-478.
10. Rushbrook, JL, White G, Kidger L, Marsh P, Taggart T. The antibacterial effect of 2-octyl cyanoacrylate (Dermabond®) skin adhesive. *J Infect Prev* 2014;15(6):236-239.
11. Tan HL, Nah SA, Budianto II, Sehat S, Tamba R. The use of octyl cyanoacrylate (superglue) in hypospadias repair including its use as a fixator for urethralstents. *J Pediatr Surg* 2012;47(12):2294-2297.
12. Hosseini SM, Rasekhi AR, Zarenezhad M, Hedjazi A. Cyanoacrylate glue dressing for hypospadias surgery. *N Am J Med Sci* 2012;4(7):320-322.
13. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG, Research electronic data capture (REDCap) – A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42(2):377-381.
14. Voznesensky M, Mutter C, Hayn M, Kinkead T, Jumper B. Pediatric sutureless circumcision: an effective and cost efficient alternative. *Can J Urol* 2015;22(5):7995-7999.
15. Van Haute C, Tailly T, Klockaerts K, Ringoir Y. Sutureless circumcision using 2-Octyl cyanoacrylate results in more rapid and less painful procedures with excellent cosmetic satisfaction. *J Pediatr Urol* 2015;11(3):147.e1-5.
16. Ambriz-González G, Aguirre-Ramirez P, García-de León JM et al. 2-octyl cyanoacrylate versus reintervention for closure of urethrocutaneous fistulae after urethroplasty for hypospadias: a randomized controlled trial. *BioMed Central Urol* 2014;14(93):1-6.