Contents lists available at IOCS

Science Midwifery

journal homepage: www.midwifery.iocspublisher.org

Bloodless, painless, suture less circumcision: A combination of diode laser with cyanoacrylate skin glue in patient with second grade of phimosis

Fadli Robby Amsriza[1], Rizka Fakhriani[2]

[1]Department of Surgery, Faculty of Medicine and Health Science, Universitas Muhammadiyah Yogyakarta, Indonesia

[2]Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine and Health Science, Universitas Muhammadiyah Yogyakarta, Indonesia

ARTICLEINFO

Article history:

Received Mar 28, 2025
Revised Mar 30, 2025
Accepted Apr 10, 2025

Keywords:

Circumcision
Cyanoacrylate
Diode Laser
Phimosis

ABSTRACT

Circumcision is a common surgical operation that entails excising the foreskin from the penis, primarily to improve hygiene and prevent the accumulation of smegma. This practice is widely observed worldwide, especially within Muslim and Jewish populations. However, despite its advantages, circumcision may lead to several complications, such as excessive bleeding and infections. A healthy 13-year-old male presented for circumcision due to grade 2 phimosis, seeking to improve his personal hygiene. The procedure was executed using a combination of diode laser technology and cyanoacrylate skin glue, which minimized tissue trauma and provided effective wound closure. When circumcision is performed utilizing advanced methods such as diode laser and cyanoacrylate glue, it is regarded as a safe and effective intervention. This approach offers considerable benefits in terms of recovery duration, cosmetic results, and overall patient comfort, while also maintaining low rates of complications.

Corresponding Author:

Fadli Robby Amsriza,
Department of Surgery,
Faculty of Medicine and Health Sciences,
Universitas Muhammadiyah Yogyakarta,
Brawijaya Street, Geblagan, Tamantirto, Kasihan, Bantul, Special Region of Yogyakarta, 55183, Indonesia
Email: fadli.robby@umy.ac.id

INTRODUCTION

Circumcision is a surgical procedure designed to excise part or all of the foreskin, also known as the prepuce, from the penis. It is one of the most frequently performed surgical procedures globally. The primary purpose of circumcision is to prevent the buildup of smegma in the penis. Smegma is a waxy substance produced by the glands in the foreskin, located along the skin and mucosal lining of the foreskin. The accumulation of smegma within the foreskin creates an ideal environment for bacterial growth (Daryanto et al., 2024). This procedure has been seen as a rite of passage into adulthood and a practice aimed at enhancing hygiene (Ahinkorah et al., 2020; Raveenthiran, 2018; Warees M. Warees et al., 2025). Approximately 37-39% of the male population

worldwide has been circumcised, with the highest prevalence observed in Muslim and Jewish countries, where the rate is around 62.1% (Prabhakaran et al., 2018; Surya et al., 2024).

Similar to other surgical interventions, circumcision is associated with various difficulties. Initial complications often include leakage, bleeding, infections at the wound site, discomfort, and swelling (Kılıç, 2024). In more severe cases, complications such as significant hemorrhaging and glans penis amputation can occur. Chronic issues may include ongoing pain, infections, meatal stenosis, fistula formation, decreased penile sensitivity, and alterations in sexual performance (Bernaschina-Rivera et al., 2023).

Currently, circumcision can be performed for various medical and non-medical reasons. Common medical indications include phimosis, paraphimosis, penile cancer, and inadequate response to local therapy for inflammation of the glans penis or prepuce. Non-medical reasons for the procedure are often related to religious, social, cultural, and personal beliefs (Czajkowski et al., 2021). Phimosis, which can be either congenital or acquired, is a condition affecting the penis. It is characterized by natural adhesions between the glans and the foreskin, an excess of foreskin, and varying degrees of tightness at the opening, hindering the complete or partial exposure of the glans (Fahmy, 2020; Falcão et al., 2018).

We report a case involving a 13-year-old boy with grade 2 phimosis who underwent circumcision performed with a combination of diode laser and cyanoacrylate skin glue.

RESEARCH METHOD

A healthy 13-year-old male was brought by his parents to a surgeon for circumcision to achieve better personal hygiene. He was not taking any regular medications and had no significant past medical history. Upon clinical examination, the patient exhibited an inability to retract the foreskin covering the glans penis. According to the retractability grading of phimosis by Kikiros et al., the patient was classified as having grade 2 phimosis, characterized by partial exposure of the glans, with the prepuce limiting this exposure (not due to congenital adhesions) (Figure 1).

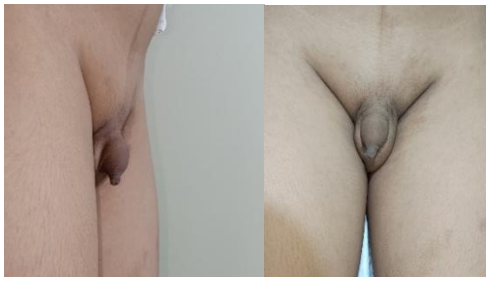
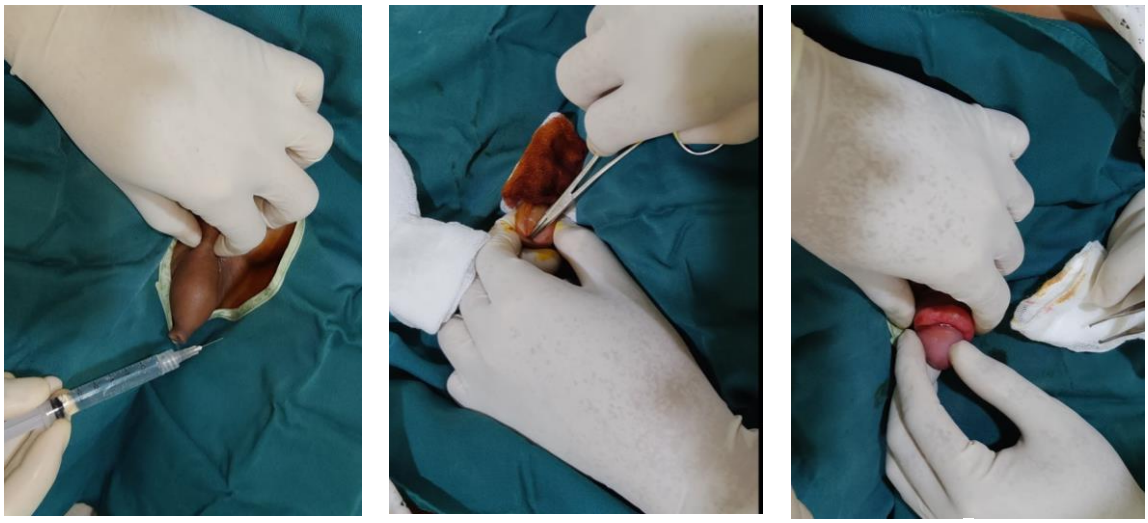


Figure 1. The condition of the patient before the surgical procedure, exhibiting grade 2 phimosis

The surgical site was cleared of debris and disinfected. We administered a dorsal penile nerve block using lidocaine HCl (20 mg/ml) in combination with epinephrine (0.0125 mg/ml), with approximately 3 ml used. The circumcision procedure was similar to the manual guillotine method, except that a diode gallium aluminum arsenide laser (980+1470 nm) was utilized instead of a scalpel. This allowed for the extraction of the preputial skin with minimal damage to the surrounding tissues. The diode laser, which cuts and coagulates simultaneously, was employed for more vascularized areas. After removing the prepuce, we applied N-Butyl 2-cyanoacrylate skin glue.



a b c

Figure 2. (a) The patient receiving local anesthesia. (b) Adhesions were observed at the mid-third of the glans penis, followed by blunt dissection to expose the sulcus corona glandis. (c) After exposing the sulcus, the prepuce was returned to its original position and clamped at the 6, 10, and 14 o'clock positions.

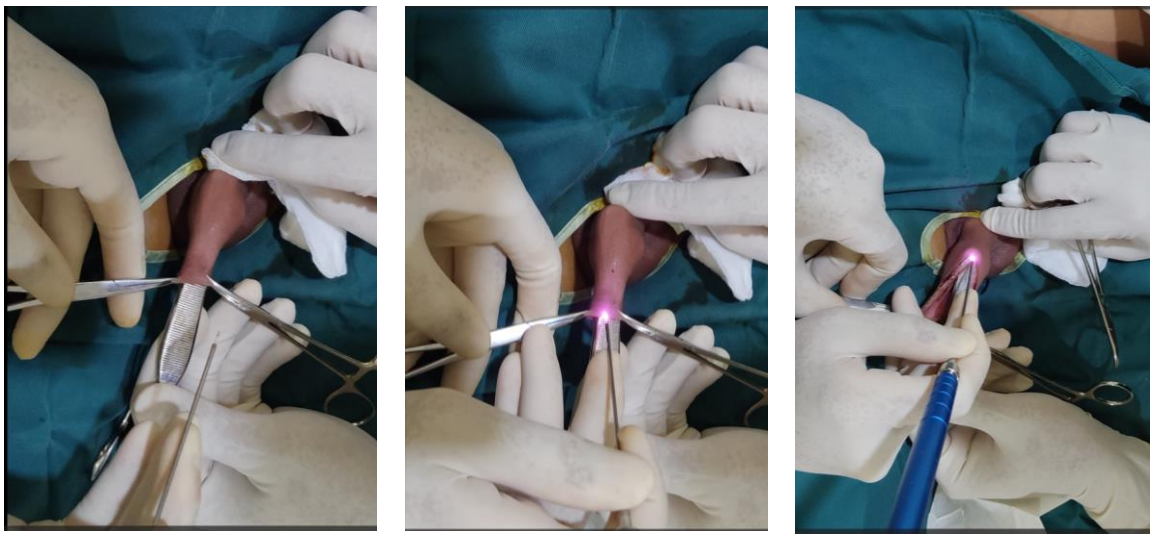


Figure 3. The prepuce was cut from distal to proximal up to the sulcus corona glandis at the 12 o'clock position, using the back part of the forceps as protection for the glans penis

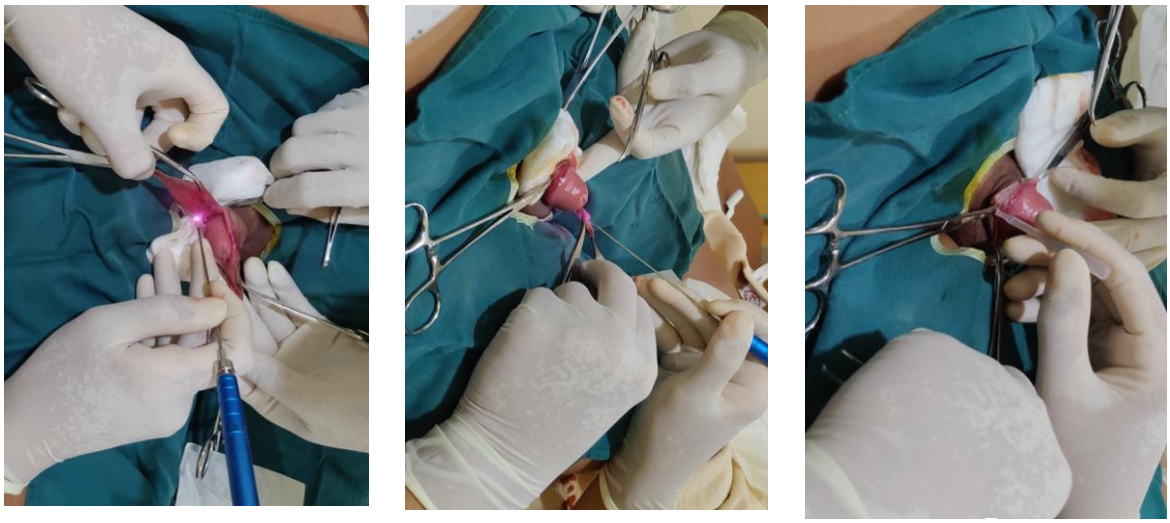


Figure 4. (a) The cutting of the prepuce continued on the right and left sides, starting from distal to proximal. (b) The cuts at the frenulum were then refined, followed by the mucocutaneous junction being secured with clamps at the 12, 3, 6, and 9 o'clock positions. (c) Skin adhesive was applied using an applicator around the length of the incision

After the completion of the surgical intervention, the condition of the patient was closely monitored. Post-operative evaluations are vital to assess healing, manage any pain, and identify potential complications such as infection or excessive bleeding. The procedure was designed to ensure minimal discomfort and a quick recovery. The circumcision was performed with minimal bleeding, and the Visual Analog Scale (VAS) for pain was rated at 1. Additionally, the patient was prescribed an oral antibiotic.

Figure 5. The condition of the patient after undergoing the procedure

RESULTD AND DISCUSSIONS

Circumcision is among the most frequently performed urological surgeries worldwide, carried out for various medical, religious, and cultural reasons. The procedure offers several advantages, including a decrease in urinary tract infections and sexually transmitted diseases, as well as the prevention of conditions like balanitis, phimosis, and paraphimosis (Ronchi et al., 2022). When conducted by trained surgeons, circumcision is considered a safe and reliable procedure with low rates of complications (Brian J. Morris et al., 2022). Despite its simplicity, it is important to

acknowledge the potential for complications. The most prevalent complication is bleeding, which occurs in approximately 0.1% to 3.1% of cases and can be effectively managed through ligation or electrocoagulation.

Circumcision techniques are generally classified into four categories: dorsal slit, free-hand cutting, shield-assisted approaches, and clamp or sleeve excision, each having its advocates. The use of laser technology in circumcision is viewed as a safer and more comfortable modern technique, primarily due to its non-invasive nature and its ability to minimize bleeding. The diode laser has been confirmed as effective in multiple soft tissue surgical fields, such as aesthetic medicine, plastic surgery, gynecology, general surgery, proctology, and endovenous phlebology. Its particular wavelength allows for quick and efficient cutaneous incisions, enabling atraumatic hemostasis, skin tightening, and contouring, as well as improved fractional rejuvenation of the skin (D et al., 2019; Dodero et al., 2018; Li et al., 2019; Zhang et al., 2018). Additionally, diode lasers may enhance aesthetic outcomes by supporting wound healing and skin remodeling, while effectively combining the functions of cutting and coagulation.

Cyanoacrylate glue are monomers that polymerize to form strong bonds in the presence of body fluids or tissues, and they have been effectively employed to treat skin lacerations. These glues are bactericidal, chemically stable, and easy to store, making them clinically advantageous. Recent clinical findings show that wounds treated with tissue adhesives have a low rate of dehiscence, fewer infections, and better cosmetic results. As alternatives to traditional sutures, Cyanoacrylates have gained increased acceptance in clinical practice due to their ease of application, decreased scarring, reduced pain, and superior cosmetic outcomes. They also prevent the discomfort often experienced with sutures, such as adherence to clothing and dressings (Azmi et al., 2022; Gorgulu et al., 2016; Lovin et al., 2022).

N-butyl-2-cyanoacrylates are known for their minimal histotoxicity and have been extensively utilized due to their significant advantages. Since its introduction 40 years ago, N-butyl-2-cyanoacrylate glue has been employed in various applications (Singh et al., 2019). For surgical wound closure in clean and clean-contaminated surgeries, N-butyl cyanoacrylate presents a reliable, safe, and cosmetically pleasing option compared to standard sutures. This type of cyanoacrylate glue is associated with less pain than traditional sutures, while showing comparable local complication rates and cosmetic results (Aravind et al., 2024).

Circumcision represents a prevalent surgical procedure conducted for both health and cultural motives, particularly to enhance hygiene and prevent complications associated with conditions like phimosis. The case of a 13-year-old boy who underwent circumcision with diode laser and cyanoacrylate skin glue highlights advancements in surgical techniques that promote safer and more efficient outcomes. The use of laser technology minimizes bleeding and supports quicker recovery, while cyanoacrylate adhesives provide better cosmetic outcomes and less postoperative discomfort. The findings from this procedure highlight the importance of modern methods in enhancing patient safety and satisfaction. Given its cultural significance in numerous communities, the integration of advanced techniques can harmonize medical benefits with traditional beliefs. Ongoing research and clinical assessments are vital to establish the efficacy and safety of these modern approaches, ensuring that circumcision continues to be a viable option for those seeking its advantages. Ultimately, when performed with the latest technologies, circumcision can lead to better health outcomes while minimizing complications, reinforcing its role as a standard practice in urological health.

CONCLUSION

The introduction of laser technology in circumcision has proven to be a safer and more effective method, significantly reducing bleeding and facilitating quicker recovery. Additionally, cyanoacrylate skin glue has demonstrated better cosmetic results and less pain compared to traditional suturing methods. This modern approach not only caters to medical needs but also

respects cultural traditions, establishing it as a valuable technique in urological surgery. Our findings indicate that the combination of diode laser and cyanoacrylate skin glue in circumcision for patients with second-grade phimosis effectively reduces recovery duration, enhances cosmetic results, and helps prevent infections.

The results of this study have high practical relevance in the context of public health policy, especially in dengue hemorrhagic fever (DHF) prevention efforts. The findings on the relationship between knowledge, attitudes, and actions of patients' families towards PSN behavior can be the basis for local governments or health agencies such as the Health Office to design more effective community-based education and intervention programs. For future research, it is recommended that a more in-depth study be conducted using a qualitative or mixed methods approach to explore other factors that have not been revealed in this study, especially related to sociocultural aspects that influence mosquito nest eradication behavior at the household level.

References

Ahinkorah, B. O., Hagan, J. E., Seidu, A.-A., Torgbenu, E., Budu, E., & Schack, T. (2020). Understanding the linkages between male circumcision and multiple sexual partnership among married Ghanaian men: Analysis of data from the 2014 Ghana demographic and health survey. *SSM - Population Health*, *11*, 100622. https://doi.org/10.1016/j.ssmph.2020.100622

Aravind, K., Sunil, C. G., Chandrasekar, S., Shidlingappa, S. S., Kamat, V., Kulkarni, M., Balachandra, S. P., Chandran, A., & Vaidyanathan, R. (2024). Cyanoacrylate vs. sutures in clean and clean-contaminated surgical wounds – a randomised control study. *Innovative Surgical Sciences*, *9*(1), 47–54. https://doi.org/10.1515/iss-2023-0060

Azmi, Y. A., Yogiswara, N., & Renaldo, J. (2022). The efficacy of tissue glue in pediatric circumcision wound approximation: A meta-analysis of randomized controlled trial. *Journal of Pediatric Urology*, *18*(3), 327–333. https://doi.org/10.1016/j.jpurol.2022.03.010

Bernaschina-Rivera, S. A., López-Chaim, A. I., Cordero-Pacheco, J. A., Fernández-Crespo, R., Quesada-Olarte, J., & Carrión, R. (2023). Circumcision and Sexual Medicine. *Sexual Medicine Reviews*, *11*(4), 412–420. https://doi.org/10.1093/sxmrev/qead009

Morris, B. J., Athos Katelaris, Norman J. Blumenthal, Mohamed Hajoona, Adrian C. Sheen, Leslie Schrieber, Eugenie R. Lumbers, Alex D. Wodak, & Phillip Katelaris. (2022). Evidence-based circumcision policy for Australia. *Journal of Men's Health*, *18*(6), 1. https://doi.org/10.31083/j.jomh1806132

Czajkowski, M., Czajkowska, K., Zarańska, K., Giemza, A., Kłącz, J., Sokołowska-Wojdyło, M., & Matuszewski, M. (2021). Male Circumcision Due to Phimosis as the Procedure That Is Not Only Relieving Clinical Symptoms of Phimosis But Also Improves the Quality of Sexual Life. *Sexual Medicine*, *9*(2), 100315–100315. https://doi.org/10.1016/j.esxm.2020.100315

Dodero, D., Frascani, F., Angelucci, M., Bernabei, G., Merlo, E., Locatelli, F., Recalcati, D., & Murina, F. (2019). Histological Modifications of Postmenopausal Vaginal Mucosa after Regenerative Solid State Laser Treatment: A Multicenter Study. *International Journal of Women's Health and Wellness*, *5*(3). https://doi.org/10.23937/2474-1353/1510099

Daryanto, B., Satyagraha, P., Kustono, A., Dhani, F. K., Negara, E. P., Purnomo, A. F., Sholihah, N., & Hanggara, D. S. (2024). Factors Influencing Post-Circumcision Wound Healing. *Indonesian Journal of Urology*, *31*(2). https://doi.org/10.32421/juri.v31i2.960

Dodero, D., Frascani, F., Angelucci, M., Bernabei, G., Merlo, E., Locatelli, F., & Murina, F. (2018). Solid State Vaginal Laser for the Treatment of Genitourinary Syndrome of Menopause: A Preliminary Report. *Open Journal of Obstetrics and Gynecology*, *08*(02), 113–121. https://doi.org/10.4236/ojog.2018.82015

Fahmy, M. A. B. (2020). Phimosis. In *Normal and Abnormal Prepuce* (pp. 163–179). Springer International Publishing. https://doi.org/10.1007/978-3-030-37621-5_18

Falcão, B. P., Stegani, M., & Matias, J. E. F. (2018). Phimosis and Circumcision: Concepts, History, and Evolution. *International Journal of Medical Reviews*, *5*(1), 6–18. https://doi.org/10.29252/IJMR-050103

Gorgulu, T., Olgun, A., Torun, M., & Kargi, E. (2016). A fast, easy circumcision procedure combining a CO2 laser and cyanoacrylate adhesive: a non-randomized comparative trial. *International Braz j Urol*, *42*(1), 113–117. https://doi.org/10.1590/S1677-5538.IBJU.2015.0284

Kılıç, S. (2024). Comparative analysis of two methods in circumcision: a new disposable device versus classic sleeve technique. *BMC Urology*, *24*(1), 126. https://doi.org/10.1186/s12894-024-01513-9

Li, K., Nicoli, F., Xi, W. J., Zhang, Z., Cui, C., Al-Mousawi, A., Balzani, A., Tong, Y., & Zhang, Y. (2019). The 1470 nm diode laser with an intralesional fiber device: a proposed solution for the treatment of inflamed and infected keloids. *Burns & Trauma*, *7*. https://doi.org/10.1186/s41038-019-0143-6

Lovin, J. M., Stone, K. M., Pickett, J. K., & Kirsch, A. J. (2022). Sutureless circumcision using monopolar diathermy and 2-octyl cyanoacrylate is safe and effective in a cohort of 634 post-neonatal prepubescent boys. *Journal of Pediatric Urology*, *18*(6), 790–795. https://doi.org/10.1016/j.jpurol.2022.03.014

Prabhakaran, S., Ljuhar, D., Coleman, R., & Nataraja, R. M. (2018). Circumcision in the paediatric patient: A review of indications, technique and complications. *Journal of Paediatrics and Child Health*, *54*(12), 1299–1307. https://doi.org/10.1111/jpc.14206

Raveenthiran, V. (2018). The evolutionary saga of circumcision from a religious perspective. *Journal of Pediatric Surgery*, *53*(7), 1440–1443. https://doi.org/10.1016/j.jpedsurg.2018.03.001

Ronchi, P., Scarcella, S., Manno, S., Beatrici, V., & Dell'Atti, L. (2022). Dual laser circumcision: a novel technique to improve traditional surgery. *Laser Therapy*, *29*(2), 94–99. https://doi.org/10.4081/ltj.2022.295

Singh, P. K., Degala, S., Shetty, S., Rai, V. S., & Das, A. (2019). To Evaluate the Efficacy and Effectiveness of N-butyl-2-cyanoacrylate glue (TRU SEAL) in Closure of Oral and Maxillofacial Laceration and Surgical Incisions. *Journal of Maxillofacial and Oral Surgery*, *18*(1), 131–138. https://doi.org/10.1007/s12663-018-1111-6

Surya, P. A., Putratama, A., Surya, R. N. H., & Ananda, G. Y. P. (2024). The Association of Circumcision and Genitourinary Cancer, Especially Penile Cancer and Prostate Cancer: A 30-Year Systematic Review and Meta-Analysis. *Indonesian Journal of Cancer*, *18*(3), 354–361. https://doi.org/10.33371/ijoc.v18i3.1123

Warees, M. W., Sachit Anand, Stephen W. Leslie, & Alexander M. Rodriguez. (2025, January). *Circumcision*. StatPearls Publishing.

Zhang, X., Wang, X., Gao, C., Qin, J., Zhao, H., Li, W., & Lu, X. (2018). A 1470-nm laser combined with foam sclerotherapy in day surgery: a better choice for lower limb varicose veins. *Lasers in Medical Science*, *33*(7), 1505–1511. https://doi.org/10.1007/s10103-018-2507-8