

Access this article online
Quick Response Code:

Website: www.ajts.org
DOI: 10.4103/ajts.ajts_160_21

## Effect of leukapheresis on pain reduction in leukemic priapism

Shahida Noushad, Dibyajyoti Sahoo, Abhishekh Basavarajegowda, Esha Toora, Purshotam Paudel

### Abstract:

Priapism is a rare presentation of Chronic Myeloid Leukaemia (CML). It is also considered a medical emergency as delay in treatment may lead to impotence. Prompt medical and surgical interventions such as hydroxyurea, analgesia, phenylephrine injection and aspiration, open surgical shunting, and local radiation therapy are essential. Leukapheresis effectively reduces leukocyte count rapidly and effectively, thereby an important therapy along with other standard of care in CML-induced priapism. In the present case, priapism was the presenting symptom of CML. The same was managed with various modalities such as hydroxyurea, allopurinol, antibiotics, analgesics, sedatives, phenylephrine injection, and aspiration but failed to reduce priapism pain. With a single cycle of leukapheresis, priapism pain could be reduced significantly.

### Keywords:

Leukapheresis, pain, priapism

### Introduction

Priapism is characterized by prolonged, persistent, painful, and irreducible pathological erection, not resulting in ejaculation.<sup>[1]</sup> It is considered an andrological emergency that may have a poor prognosis. The risk of impotence is 50% despite appropriate management. Since it is a medical emergency, a delay in its management can lead to erectile dysfunction or impotence in the future. Thus, prompt treatment is essential. Types of priapism include ischemic and nonischemic. The most common cause of ischemic type is idiopathic (65%), followed by hematological disorders (20%). Sick cell anemia, Chronic Myeloid Leukaemia (CML), chronic lymphocytic leukemia, acute lymphoblastic, and other leukemias are hematological disorders that can cause priapism. It is a rare complication, and thus, most physicians are

inexperienced in managing the condition. Since only case reports are available, there is no standard treatment protocol.

Earlier case reports have shown successful treatment of ischemic priapism with phenylephrine injection and aspiration, open surgical shunting, local radiation therapy, or a combination of these treatments. More recent publications on leukemic priapism have come up with cytoreductive modalities such as chemotherapy, leukapheresis, or a combination of both. In the present case, we describe a case in which routine treatment failed to decrease pain. Prompt leukapheresis after a failed aspiration and irrigation with phenylephrine bring down the pain in CML-induced priapism.

### Case Report

A 32-year-old man, a welder by profession without any prior comorbidities, was brought to the medical emergency department room with the persistent painful erection of the penis for 5-day

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Noushad S, Sahoo D, Basavarajegowda A, Toora E, Paudel P. Effect of leukapheresis on pain reduction in leukemic priapism. Asian J Transfus Sci 2022;16:124-7.

Department of Transfusion  
Medicine, Jawaharlal  
Institute of Postgraduate  
Medical Education and  
Research, Puducherry,  
India

#### Address for correspondence:

Dr. Dibyajyoti Sahoo,  
Department of Transfusion  
Medicine, Jawaharlal  
Institute of Postgraduate  
Medical Education and  
Research (JIPMER),  
Puducherry, India.  
E-mail: dib.jit@gmail.com

Submitted: 30-10-2021

Revised: 19-12-2021

Accepted: 19-12-2021

Published: 30-07-2022

duration. There was a gradual increase in pain, which impaired his ambulation. He gave a history of weight loss for 2 months (around 4 kg). He denied a history of any trauma to the penis, arousal stimulation, illicit drug intake, or any other medications. He had one episode of a similar attack of 4-h duration 7 days back, which detumesced on its own. There were no other symptoms of leukemia. The patient was treated at another hospital for a day before admission to our hospital. He was treated with cytosine arabinoside (100 mg), analgesics, (unfractionated heparin) as a short bolus, hydroxyurea (1 g 6 hourly), febuxostat, sodium bicarbonate, nifedipine, and lorazepam. His white blood cell (WBC) counts at admission were  $450 \times 10^3/\mu\text{l}$ . With the initiation of the above treatment, it reduced to  $367 \times 10^3/\mu\text{l}$ . There was some reduction in pain intensity after 24 h of admission. However, the pain recurred, and he was referred to our hospital on next day. The patient was conscious and oriented but unable to give the history due to severe pain.

The patient's vital signs were as shown: heart rate-102 beats/min, blood pressure-130/80 mmHg, RR-20/min, and SpO2-98% on room air. The conjunctiva looked pale, and clubbing was present. There was no icterus or lymphadenopathy or cyanosis, or edema. Physical findings revealed massive splenomegaly. Local examination showed a tumescent warm penis with preserved sensations, and rigid cavernosa. No evidence of associated skin changes was seen. Laboratory evaluation showed hyperleukocytosis, raised lactate dehydrogenase but no evidence of tumor lysis. Peripheral smear was consistent with the chronic phase of CML. Peripheral blood real-time polymerase chain reaction was sent for COVID-19 and found negative. From the peripheral smear report, the patient was diagnosed as CML with secondary hyperleukocytosis. The patient was restarted on 1-g hydroxyurea BD, allopurinol 100 mg TDS, antibiotics, analgesics, and sedatives. He underwent phenylephrine injection with 50-ml blood aspiration from the urology department in our hospital and had a 50% reduction in the erection. However, the pain was not relieved (pain score – 9/10). Hence, he was planned for rapid cytoreduction with leukapheresis.

The patient had a total leukocyte count of  $270.41 \times 10^3/\mu\text{l}$  before the procedure. After obtaining consent from the patient, we did one leukapheresis session using the Spectra Optia machine, a continuous flow automated cell collection system. A femoral vein catheter was used for accessing the circulation, and ACD (acid-citrate-dextrose) was used as the anticoagulant with an inlet: AC ratio of 12.0 and an inlet flow rate of 40 ml/min. No replacement fluid was used during the procedure. Collect rate was kept as 3 ml/min. A total of 5.8 liters of blood (1.5 total blood volume [TBV]) was processed, and the collected

volume was 478 ml [Figure 1]. A sample for complete blood count was taken at the end of collection for assessing the reduction in leukocyte count. Details of pre- and postprocedure hematological parameters are given in the table below [Table 1]. The general condition of the patient was stable throughout the procedure. The patient experienced immediate pain relief after the procedure, although edema at the site was not reduced significantly. Pain score showed a reduction from a score of 9–10 to a 1–2 level. The patient was started on imatinib 400 mg the next day the following leukapheresis as his [chimeric gene of BCR (Breakpoint cluster region) gene and ABL (Abelson proto-oncogene)] result came as positive. He had undergone a surgical shunt, but there was only a 30% reduction in edema. He was discharged on day 7 following leukapheresis with a leukocyte count of  $23,000/\mu\text{l}$  with advice for regular follow-up.

### Discussion

Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm. It is characterized by clonal expansion of pluripotent hematopoietic stem cells containing the active BCR-ABL fusion gene.<sup>[2,3]</sup> The disease is clinically suspected when the patient presents with an elevated WBC count and/or an enlarged spleen. Sometimes,

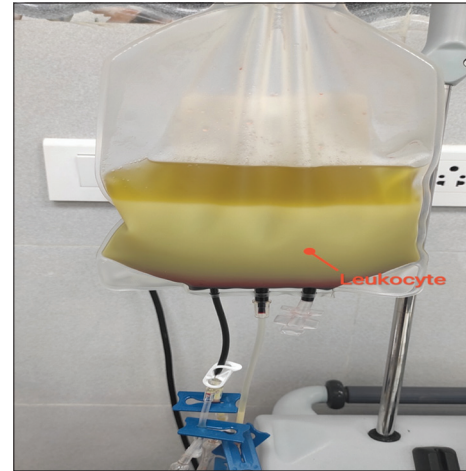


Figure 1: Leukocytes collected after leukapheresis

Table 1: Pre- and postleukapheresis parameters

Parameters	Preleukapheresis	Postleukapheresis	On discharge
Hemoglobin (g/dl)	9.1	9.8	8.7
Leukocyte count ( $\times 10^3/\mu\text{l}$ )	270.41	140.29	23.40
Differential count	N <sub>95.7</sub> L <sub>1.5</sub> M <sub>1</sub>	N <sub>95.4</sub> L <sub>1.9</sub> M <sub>0.5</sub>	N <sub>92</sub> L <sub>5.9</sub> M <sub>1</sub>
Platelet count ( $\times 10^3/\mu\text{l}$ )	134	117	160
Pain score	9–10	0–1	0–1

patients may present with leukostasis complications of hyperleukocytosis such as thromboembolic phenomena, hearing loss, or priapism.<sup>[4,5]</sup> In our patient who was later diagnosed with CML, priapism was the presenting symptom. Proposed mechanisms<sup>[6]</sup> for ischemic priapism include (1) venous obstruction caused by the microemboli or thromboemboli, (2) poor venous outflow due to hyperviscosity from an increased number of mature and immature leukemic cells, and (3) venous obstruction of the corpora cavernosa by the mechanical pressure on the abdominal veins by the massive spleen.<sup>[6]</sup> In the present case, there was massive splenomegaly with size reaching up to the right iliac fossa, which could have obstructed the smooth venous outflow from the penis leading to priapism. Furthermore, poor venous outflow due to hyperviscosity from an increased number of mature and immature leukemic cells could have led to priapism.

Priapism is a medical emergency that warrants urgent medical attention. The vital step in the management is to determine the etiology of the condition as it is a rare sign of a severe underlying systemic illness. The effort to bring down the pain using penile anesthesia or systemic analgesics is less valuable in the case of ischemic priapism. Most often, the patient needs an interventional approach such as aspiration-irrigation, shunting, or leukapheresis. In the present case, the patient was medicated with hydroxyurea, allopurinol, antibiotics, analgesics, and sedatives. He also underwent phenylephrine injection with 50-ml blood aspiration. All these failed to reduce pain even after 3 days of aggressive treatment. The pain continued (pain score – 9/10) as before. Hence, he was preceded for rapid cytoreduction by leukapheresis. Following the leukapheresis procedure, there is a significant reduction of pain. Sometimes, pain in priapism may be severe and can be unresponsive to high-dose analgesia. When a severe pain crisis is unresponsive to the standard therapy, leukapheresis helps to improve pain by rapid reduction of leukocytes. Many case series have reported the successful use of therapeutic leukapheresis to treat priapism.<sup>[6-8]</sup> In most of the cases, leukapheresis was combined with cytotoxic therapy.

Leukapheresis removes excessive leukocytes from the peripheral blood with the return of remaining constituents into the patient's circulation. High leukocyte counts have a negative impact on early survival and complete remission status. Thus, therapeutic leukapheresis might help in rapid cytoreduction of activated leukocytes, thereby decreasing morbidity and mortality. It is typically employed as adjunctive therapy to alleviate hyperleukocytosis symptoms or bridge to the effects of more definitive therapy or to avoid teratogenic effects of definitive therapy in pregnancy complicated

by myeloproliferative disorders. Clinical leukostasis is considered as Category I (Grade 1b) indication by the American Society for Apheresis (ASFA).<sup>[9]</sup> For prophylactic use in preventing tumor lysis syndrome and asymptomatic hyperleukocytosis, it is Category III (Grade 2c) indication. As per ASFA, minimum of 1.5–2 BV is to be processed for successful leukapheresis effects. These guidelines do not mention the percentage of leukocyte reduction to be done for symptomatic relief. Factors influencing the removal efficiency of leukocytes include the total number of leukocytes present in the circulation, TBV processed, the volume of the removing leukocytes, and the rate of mobilization from the marrow or extramedullary sites during the procedure. Since leukocyte is significantly larger than platelets, a larger volume of cells is to be removed in leukostasis than in thrombocytosis. Thus, the addition of replacement fluids during leukapheresis is required, especially if it is a large volume leukapheresis, where 3–6 TBV is processed. In this case, no replacement fluid was used, as total volume processed was only 1.5 TBV, also the removed volume was only 478 ml. The patient was hemodynamically stable throughout the procedure. Reduction in the postleukocyte count is often less than expected due to rapid recruitment of leukemic cells in the S-phase from the marrow into the peripheral circulation. Mobilization during leukapheresis is unpredictable and cannot be integrated into the calculations used for apheresis removal of cells at present.

## Conclusion

The present case has shown that leukapheresis might be a helpful adjuvant therapy in the management of priapism not responsive to other therapeutic measures by rapidly decreasing the leukocyte count. It also reduced priapism pain significantly when other modalities failed. However, the treatment of priapism in CML remains a multidisciplinary approach, including hematology, urology, transfusion medicine, and emergency medicine.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Keoghane SR, Sullivan ME, Miller MA. The aetiology, pathogenesis and management of priapism. *BJU Int* 2002;90:149-54.
2. Fausel C. Targeted chronic myeloid leukemia therapy: Seeking a cure. *J Manag Care Pharm* 2007;13:8-12.
3. Ferdinand R, Mitchell SA, Batson S, Tumor I. Treatments for chronic myeloid leukemia: A qualitative systematic review. *J Blood Med* 2012;3:51-76.
4. Ocheni S, Ibegbulam OG, Olusina DB, Oyekunle AA, Durosinmi MA. Chronic myeloid leukemia presenting as priapism: A report of 2 cases and review of literature. *J Coll Med* 2010;15:76-80.
5. Rowe JM, Lichtman MA. Hyperleukocytosis and leukostasis: Common features of childhood chronic myelogenous leukemia. *Blood* 1984;63:1230-4.
6. Ponniah A, Brown CT, Taylor P. Priapism secondary to leukemia: Effective management with prompt leukapheresis. *Int J Urol* 2004;11:809-10.
7. Castagnetti M, Sainati L, Giona F, Varotto S, Carli M, Rigamonti W. Conservative management of priapism secondary to leukemia. *Pediatr Blood Cancer* 2008;51:420-3.
8. Shafique S, Bona R, Kaplan AA. A case report of therapeutic leukapheresis in an adult with chronic myelogenous leukemia presenting with hyperleukocytosis and leukostasis. *Ther Apher Dial* 2007;11:146-9.
9. Padmanabhan A, Connelly-Smith L, Aqil N, Balogun RA, Klingel R, Meyer E, *et al.* Guidelines on the use of therapeutic apheresis in clinical practice – Evidence-based approach from the writing committee of the American society for apheresis: The eighth special issue. *J Clin Apher* 2019;34:171-354.