

Role of Autologous Platelet Rich Plasma in Macroductyly

Sagar Prakash¹, Ravi Kumar Chittoria², Neljo Thomas³

How to cite this article:

Sagar Prakash, Ravi Kumar Chittoria, Neljo Thomas/Role of Autologous Platelet Rich Plasma in Macroductyly/ Ophthalmol Allied Sci. 2022;8(1): 9-11.

Abstract

The efficacy of Autologous Platelet Rich Plasma (APRP) for macroductyly to reduce scarring post reduction in the bulk of the toe. Multiple applications of APRP have been identified in the field of scar management and wound outcomes previously. In our study APRP was utilised in a subject with left big toe macroductyly to evaluate the efficacy and mechanism of action of a invasive body contouring intervention approach using APRP for scar management.

Keyword: Autologous Platelet Rich Plasma (APRP); Macroductyly; Scar reduction.

INTRODUCTION

Macroductyly is a rare congenital condition encountered that is characterised by the excessive growth of the fingers or toes. Primary macroductyly is defined as nonsyndromic, congenital overgrowth of a digit or digits that occurs in isolation without concomitant limb hypertrophy or vascular abnormality. It is usually seen to affect both the digit's bone and soft tissue components. One in 18,000 people are estimated to have primary macroductyly, with a little male predominance.

Additionally, tumor-forming conditions such neurofibromatosis, lymphangiomas, fibrous dysplasia, and haemangiomas, as well as conditions like Proteus or Klippel-Trenaunay syndromes, can cause foot enlargement. Only the skin or soft tissue is hypertrophied in these cases, and the enlargement is known as secondary macroductyly.¹ APRP application in the treatment of macroductyly is the primary aim of this study.

MATERIALS AND METHODS

This study was conducted in tertiary care centre in department of plastic surgery after getting the department ethical committee approval. Informed consent was obtained for examination and clinical photography. The subject was 12 years old female presented with increased size of the left big toe since 11 years. Patient's mother noticed an increase in the size of left big toe at 1 year. The size increased progressive as she grow and attained the present size. No history of trauma, difficulty in walking, increase in size elsewhere in the body. No history

Author Affiliation: ¹Junior Resident, ²Professor, ³Senior Resident, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

Corresponding Author: Ravi Kumar Chittoria, Professor, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

Email: drchittoria@gmail.com

Received on: 05.07.2022

Accepted on: 18.07.2022

of any vertebral anomalies, anal disorder, heart disease, organomegaly. Child appears short for her age and not attained menarche.

Mother had normal course during the child birth which was full term normal delivery. No history of any intake of medication or radiation in the antenatal period.

On local examination of left leg and foot showed a swelling of left big toe which was non pulsatile, non compressible. Skin over the swelling shows no sign of inflammation (Fig. 1) skin over swelling was pinchable. The range of movements at knee, ankle, toe movements at Meta Tarso Phalangeal, Proximal Inter Phalangeal, Distal Inter Phalangeal joints was normal. The distal sensation, capillary refill time were normal. The opposite limb normal. The gait was normal. Other systemic examinations were within normal limits.



Fig. 1: Macroductyly left big toe

Initially patient underwent liposuction assisted debulking. Then patient underwent APRP injection at local site (Fig. 2).



Fig. 2: Local injection of Autologous platelet rich plasma at site of scar

The initial Vancouver scar scale was calculated to be 9. Autologous platelet rich plasma was obtained by standard double centrifugation protocol using 10cc of patient's blood and was used for reducing the post operative scar formation post debulking procedure for macroductyly. This was done over 8 sittings on weekly basis over 2 months. Scar being assessed with Vancouver scar scale and patient level of satisfaction.

RESULTS

After application of APRP over period, in our study, we were able to successfully reduce the scar with reduction in Vancouver scar scale to 3 and patient level of satisfaction also improved (Fig. 3). No adverse local or systemic effect noted with use of APRP.



Fig. 3: Post Autologous platelet rich plasma scar

DISCUSSION

Macroductyly is gain-of-function mutation in the PIK3CA pathway (Phosphatidylinositol-4,5-Bisphosphate 3-Kinase) causes it to be an overgrowth condition.^{6,7} The correct regulation of cell growth, metabolism, and survival depends on the PI3K/AKT/mTOR signalling pathway. Cancer and a range of overgrowth diseases known as the PIK3CA-Related Overgrowth Spectrum can result

from somatic mutations in this system (PROS). AKT and mTOR are physiologically inappropriately activated by PIK3CA mutations in PROS, which results in asymmetric overgrowth. This spectrum includes conditions like macroductyly, hemimegalencephaly, and CLOVES (Congenital Lipomatous Overgrowth, Vascular Malformation, Epidermal nevi, Spinal/Skeletal Anomalies).^{1,2}

Patients with diagnoses of other recognised overgrowth syndromes or other syndromic presentations of enlargement of the lower extremities that were not otherwise characterised were excluded, including Klippel-Trenaunay syndrome, Proteus syndrome, CLOVES syndrome, Ollier's disease, Maffucci syndrome, Milroy's disease, neurofibromatosis, and Ollier's disease.

The condition manifests unilaterally in 95% of cases. It appears from the great toe to the fifth toe in a diminishing pattern and is significantly more common in men. In the progressive version, the toe's growth stops when the epiphyses close, the sensitivity is often normal, the mobility gets worse over time, and there are lots of early ulcers.

Ten percent of patients with macroductyly have syndactyly, while a smaller number of patients have polydactyly and cryptorchidism. It may be connected to "non-true" forms of macroductyly such as Klipper Syndrome Trenaunag Weber (hemangiomas, varicose veins, and limb hypertrophy), Maffucci Syndrome (multiple hemangiomas), Proteus Syndrome (hamartomatous dysplasia, pigmented nevi, and subcutaneous tumours), lipomas, osteoid osteoma, and melorrestosis, Macroductyly.²

Autologous platelet rich plasma (APRP) as the name suggests is plasma derived from the patient's blood and is found to have a higher count of platelets as compared to the patient's blood. Recent developments have made extensive developments in the field of sports medicine and musculoskeletal injuries. It has a pro-inflammatory environment that augments healing. Also since wounds have a high protease activity, they hinder faster healing. APRP serves as an agent which has the property of serving as source of growth factors which include the properties of mitosis, angiogenesis and

chemotaxis. APRP has action over the proliferation of Type 1 collagen and hence is the basis of its use in the above case.^{3,4} It is also logical to assume since APRP can act as a source of these growth factors that the availability of the same will be increased considerably.^{5,6}

Normally, from about 10ml of patient's blood about 1 to 1.5 ml of APRP can be extracted. Hence it cannot be used for larger surfaces and also it poses the problem of creating an uneven surface for uptake of graft or flap if required in the future.⁵

CONCLUSION

Macroductyly patient who undergo many surgical procedures throughout infancy typically end up with an unpleasant and useless toe. APRP will be alternate, Invasive adjuvant for macroductyly with good results with respect to outcome and scarring.

REFERENCES

1. Gluck, J. S., & Ezaki, M. (2015). Surgical treatment of macroductyly. *Journal of Hand Surgery*, 40(7), 1461
2. Macroductyly. A review with a case report-PubMed. (n.d.). Retrieved June 26. *Afr Med J*.1983 Jun 11;63(24):939-41.
3. Rubina Alves, Ramon Grimalt. A review of platelet-rich plasma: History, biology, mechanism of action, and classification. *Skin appendages discord* 2018; 4:18-24
4. Padmalakshmi Bharathi Mohan, Saurabh Gupta, Ravi Kumar Chittoria, Abhinav Aggarwal, Chirra Likhitha Reddy, Imran Pathan, Shijina Koliyath. Autologous Platelet-rich Plasma Enriched Pixel Grafting. *Journal of Cutaneous and Aesthetic Surgery*, Volume 13, Issue 4, October-December 2020
5. Elankumar S, Sudhanva H.K., Abhinav A, Chittoria R.K. APRP spray devices: a novel technique of applying APRP. *Dermatology international* Volume 2 number 2, July to December 2017
6. Weibrich G, Kleis WK, Hafner G, Hitzler WE,. Growth factor levels in platelet- rich plasma and correlation with donor age, sex and platelet count. *Journal of cranio-maxillofacial surgery*. 2002; 30(2): 97 -102.

