

Toe-Tourniquet Syndrome; A Previously Unreported Association in Extreme Prematurity

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Abstract

Toe-tourniquet syndrome is a condition caused by hair or fibrous strands encircling a digit. It can lead to compressive oedema, ischaemia and potential loss of an appendage. The condition constitutes a surgical emergency requiring immediate intervention. We report a 23+5 weeks gestation infant weighing 545 grams at birth who was admitted to a tertiary neonatal unit for medical management of respiratory distress syndrome. The infant developed toe-tourniquet syndrome on day 18 after birth. This complication presented as ischaemic swelling of the second and third toes of one limb with the constricting fibres arising from the infant's wool blanket. Restoration of the infant's toes circulation and full recovery was achieved after manual removal of the bands. We would like to raise awareness of this condition which has not been described in extremely preterm infants previously. This is to prevent potential complications relating to wool blankets which are commonly used in neonatal units.

Keywords: Prematurity; Toe; Tourniquet; Syndrome

Introduction

Toe-tourniquet syndrome is a condition caused by hair or fibrous strands encircling a digit. It can lead to compressive oedema, ischaemia and potential loss of an appendage. The condition constitutes a surgical emergency requiring immediate intervention.

Case Report

A female infant was born prematurely at 23+5 weeks gestation weighing 545 grams at birth. Infant developed surfactant deficiency lung disease and required endotracheal intubation at birth and mechanical ventilation (MV). She had umbilical arterial and venous catheters inserted shortly after birth. Both catheters were removed on day 10 without complications. During routine nursing care on day 18, it was noted that the second and third toes of the left foot were showing signs of compression ischaemic injury (Figure 1). There were no intravenous or arterial peripheral lines sited on the left foot at the time or in the preceding 48 hours. Both toes had multiple constricting bands around the distal phalanges. Thin filaments originating from the infant's wool blanket were found wrapped around the toes resulting in skin indentation of both toes and superficial laceration on the second toe. Removal of filaments was achieved via a non-toothed fine forceps under magnification. Return of spontaneous toes' circulation occurred immediately and no surgical intervention was required. All toes recovered fully with no residual complications within two days.



Figure 1a and 1b: Compression ischaemic injury day 18 in a 23+5 weeks infant presenting as swelling and blue discoloration at the distal phalanges of the second and third toes (left foot) caused by thin wool filaments. (a) Shows in addition a superficial skin laceration on the second toe.

Discussion

Toe-Tourniquet Syndrome is a clinical phenomenon caused by hair or fibrous strands encircling a digit leading to pain, swelling and oedema of the affected part [1]. The terminology was first described by Quinn in 1971 and thought to constitute a potential surgical emergency as if left untreated can lead to necrosis, auto-amputation and loss of an appendage [2].

The pathological effects of the tourniquet results in impedance of effective lymphatic drainage from the affected part initially with the resultant swelling further impairing venous and arterial circulations leading to ischemia [3].

Telogen effluvium is a condition which occurs in approximately 90% of postpartum mothers around 3 months after delivery and can lead to severe hair loss. This increases infants' risk of developing toe-tourniquet syndrome as hair wraps itself around the toe often slicing through the skin like a garrote due to its thin high tensile strength. During this process of transformation, the hair is then buried by epithelisation which makes it difficult to visualise. The reasons for hair winding so tightly around the toes are still unknown. It is believed that when hair is moist, it is supple and once it dries up; it condenses and causes further constriction [1].

Scientific reports describe the condition as occurring in the toes of older children caused either by hair or synthetic fibres. The majority presented to the emergency or paediatric departments where treatment is usually successful [4]. To date, there has been only one case report describing the condition in a preterm infant born at 28 weeks gestation with birth weight of 1030 grams admitted for management of respiratory distress syndrome. On day 12, swelling and redness was observed in the second, third and fourth toes by the ward nurse. Threads of cotton fibres used as gauze bandage behind the infant's shoulder detached and caused the tourniquet. This was subsequently removed without complications [5].

Conclusion

Our report is the first to describe the occurrence of toe-tourniquet syndrome in an extremely premature infant born at 23+5 weeks admitted to a tertiary neonatal unit. The complication arose when fibres from infant's woollen blanket circled the second and third toes of

the left foot overtime leading to compression ischaemic changes of the affected toes constituting a surgical emergency. The mechanism of injury is thought to be related to the repetitive cyclical movement of the infants' leg against the covering blanket leading to the development of the fibre tourniquet over time. The fibres were removed under direct vision by the attending physician with immediate restoration of circulation and no long term sequelae to the infant's toes were observed. This case posed diagnostic and management challenges due to the absence of reported cases of toe-tourniquet syndrome in this age group previously and the difficulties encountered by the treating clinician to establish causation and the subsequent removal of the thin threads under magnification.

Toe-tourniquet syndrome can be misdiagnosed in the neonatal intensive care nursery and the attending clinician should have a high index of suspicion to diagnose this condition in babies presenting with isolated digital oedema especially with decreasing gestation. The commonest differential diagnosis which is linked to conditions mimicking toe-tourniquet syndrome's clinical presentation of swollen digits in the neonatal nursery are; infection, dermatitis, trauma or idiopathic oedema. If the complication is missed or left untreated, it will most likely result in loss of function if not auto-amputation of the involved digit. Early recognition of toe-tourniquet syndrome is therefore key for successful timely management and better clinical outcomes in babies. In the neonatal nursery, we recommend that materials leading to thread formation and subsequent separation like wool or cotton are not placed in infant's incubators and that non-fibre producing materials are used as blankets or baby grows for preterm babies in incubators to prevent this complication.

Bibliography

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