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Surgical Management of Post-Vaccination Quadriceps Contracture in a child using distal V-Y Quadricepsplasty: A Case Report and Rehabilitation Outcome

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Abstract

Background: Post-vaccination quadriceps contracture is a rare but disabling complication following intramuscular injection abscess in infancy.

Case presentation: A 5-year-old girl developed inability to flex her left knee after an injection abscess at 1 month of age that was surgically drained. She presented with a 4-year history of progressive contracture, thigh wasting, and delayed milestones. Clinical examination confirmed quadriceps contracture and loss of knee flexion.

Intervention: Distal V-Y quadricepsplasty was performed, followed by immobilization and comprehensive rehabilitation.

Outcomes: At 9 months post-surgery, knee flexion improved to 110° with reduced extensor lag and significant functional gains.

Conclusion: Early recognition, appropriate surgical intervention, and rehabilitation can significantly improve outcomes. Proper vaccination technique is essential to prevent such complications.

Keywords: Post-Vaccination (injection) Quadriceps Contracture, V-Y Quadricepsplasty, knee flexion, pediatric surgery, Rehabilitation and Recovery

Introduction

Post Injection Quadriceps Contracture, though rare, represent a significant complication that can arise following improper injection technique, especially in pediatric populations who receive intra-muscular vaccinations in the thigh. Quadriceps contracture in children can be due to multiple causes like congenital, infective, traumatic, post-surgical while the rarest being post-vaccination (injection) ^[1]. After an improper injection, abscess often result from bacterial infections at the injection site, leading to local tissue destruction, scarring and fibrosis causing functional impairment including delay in attaining gross motor developmental milestones. Very few studies have been published in the literature, indicating that it is an extremely rare occurrence ^[2]. This report describes the case of a 5-year-old girl who developed a Post Injection Quadriceps Contracture (PIQC) following a vaccination, which had been ignored for years and outlines the successful management through surgery and rehabilitation.

Case Report

A 5-year-old girl presented to the orthopaedics outpatient department of our hospital with a 4-year history of progressive inability to flex her left knee. The problem had been present since infancy and had worsened over time as she grew. Her medical history revealed that she had vaccination at a primary health Centre at 6 weeks of age following which she had an injection abscess in the left thigh (figure 1 (a)). This abscess was surgically drained at 8 weeks of age. Following this the patient had progressive difficulty with knee flexion, which led to delayed motor milestones, including sitting, walking, and running.

Despite multiple visits to local healthcare providers in her early years, the family was repeatedly reassured that her knee flexion would improve with growth. However, as the child grew older without significant improvement, they were referred to our institution for further evaluation.

Upon examination, the child demonstrated severely limited left knee flexion, with only 10° of active flexion.(figure 1 (b) and (c)) There was significant muscle wasting in the left lower limb (mid-thigh circumference 20cm) compared to the other side. (mid-thigh circumference

26cm), particularly in the quadriceps, which was markedly stiffened, suggesting a longstanding contracture. Based on the clinical findings, it was determined that the child had developed a Post-injection quadriceps contracture due to fibrosis of the quadriceps muscle following the initial injection abscess.



Fig 1: (a) scar of drainage of injection abscess

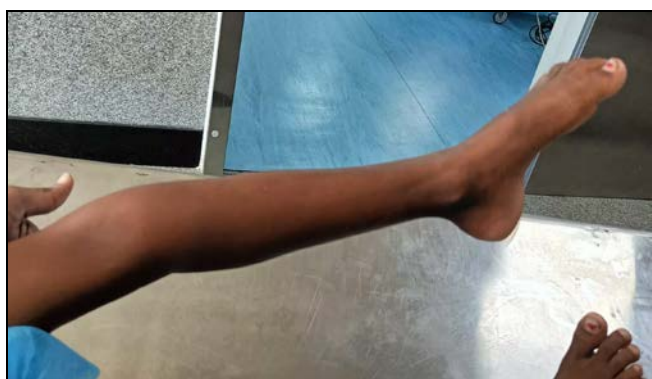


Fig 1: (b) active flexion of left knee



Fig 1: (c) comparison with normal side

After a thorough assessment, it was decided to proceed with a distal V-Y quadricepsplasty, a surgical procedure designed to release the contracted quadriceps and improve knee flexion. Under general anaesthesia in supine position, using the anterolateral approach to the distal thigh the quadriceps was exposed. The quadriceps muscle was found to be atrophic and rectus femoris and vastus intermedius could not be separated as they were adhered. There was marked stiffness and tightness at the attachment of vastus lateralis, vastus medialis and para patellar retinaculum. An inverted V-shaped incision, with each limb of V at length of 8cm was made extending from medial and lateral parapatellar

region spanning across the insertion of both the medial and lateral vastus muscle and apex at the rectus femoris (and vastus intermedius). This was sutured with ethibond 5, 0 in an inverted Y fashion with repairing of the parapatellar retinaculum on either sides (figure 2 and 3). Closure was done and the knee was immobilized in a 90° flexion position for two weeks.



Fig 2: (a) dissection after incision in anterolateral approach

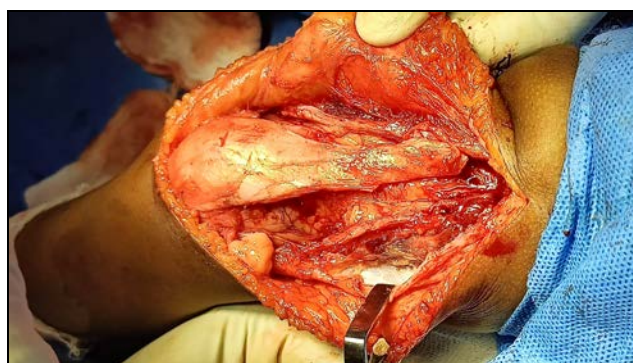


Fig 2: (b) V-shaped cut portion



Fig 2: (c) Y-shaped suturing



Fig 2: (d) post-operative immobilization

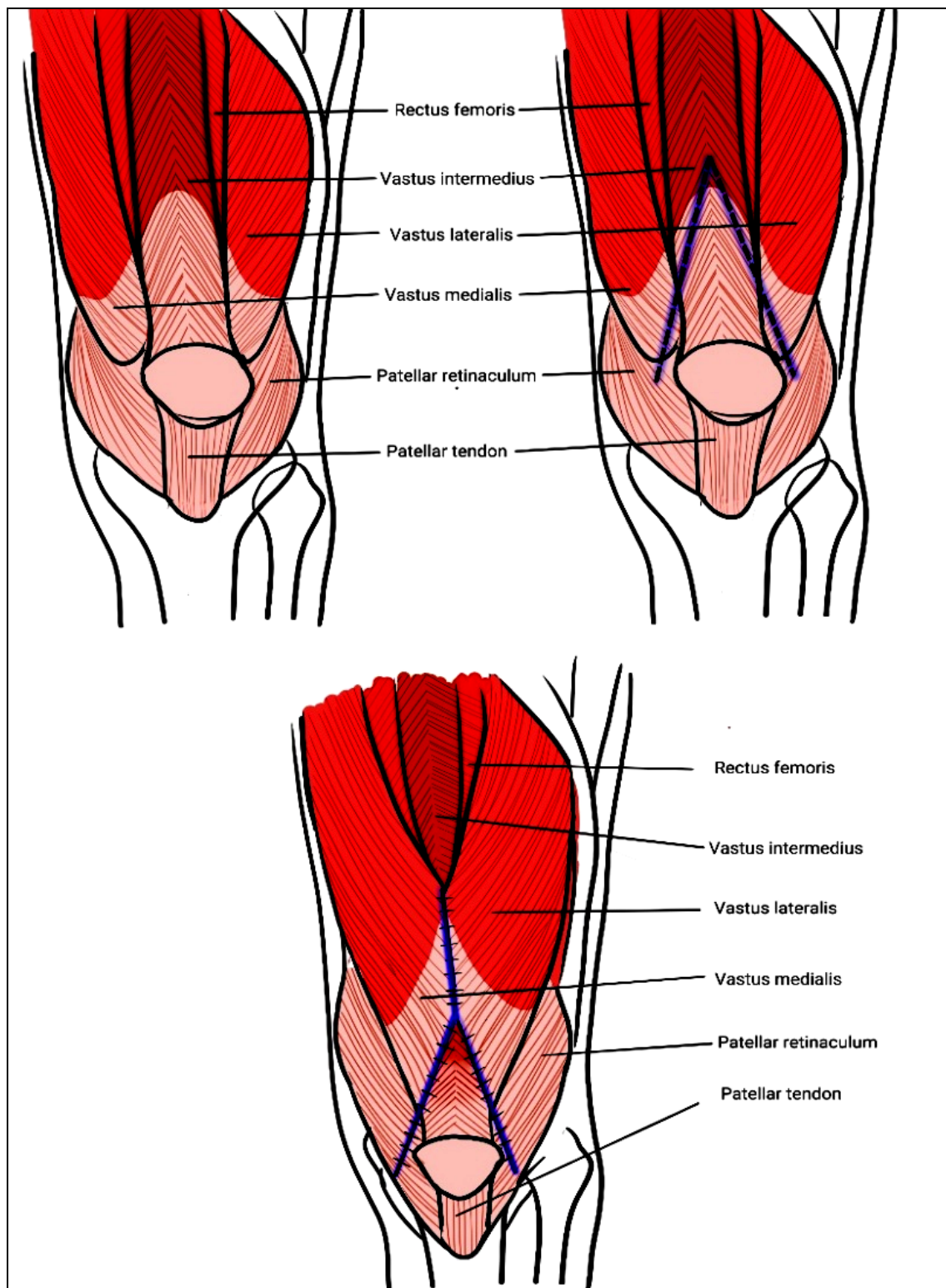


Fig 3: Illustration of the surgical procedure (made with software Krita version 5.1.5)

Two weeks later, the patient developed marginal necrosis with dehiscence of the surgical wound. This was managed with appropriate wound care and dressings. Although the wound showed delayed healing, after four weeks of continued immobilization and wound management, the wounds healed. At 4 weeks she showed an extensor lag of 20°. At that point, graded active and passive knee bending exercises and quadriceps strengthening were initiated and continued to facilitate rehabilitation. She was allowed to bear weight after 4 weeks.

At follow-up visits, the child showed significant improvement of knee flexion and reduction of extensor lag. She also started gaining quadriceps muscle volume (mid-thigh circumference 25cm at nine months). Nine months after surgery, the patient had regained 110° of knee flexion, with a substantial reduction in extensor lag to 5°. The functional improvement allowed her to walk normally and perform daily activities with minimal discomfort similar to her peers (figure 4).



Fig 4: extensor lag and flexion

Discussion

Post-injection abscesses are rare but can lead to severe and lasting complications, especially in the form of muscle contractures. While these complications are often overlooked or misdiagnosed, especially in the early stages, the long-term consequences can be debilitating if not promptly managed. In this case, the injection abscess in infancy led to progressive limitation of knee flexion and muscle contracture, severely affecting the child's functional development. Unfortunately, the diagnosis and appropriate management was delayed, and as a result, her motor milestones were impacted for years.

Many surgical methods for quadricepsplasty are established mostly for releasing contractures and lengthening the muscle with each having its own advantages and disadvantages^[3]. V-Y quadricepsplasty is one among them used to release quadriceps contractures. It involves lengthening and mobilizing the muscle-tendon unit to restore joint mobility and improve muscle function^[4]. The success of this surgical intervention in this case is evident from the significant post-operative improvement in knee flexion. However, complications such as wound dehiscence occur due to skin tension following the lengthening procedure. Attention to proper wound care and rehabilitation is critical to achieving optimal outcomes.

Improper and unhygienic vaccination practices are common in rural resource-limited settings of India. These hold a great weight on producing this rare complication of post-injection quadriceps contracture. Addressing the root cause at grass root level by proper training of personnel for sterile vaccination technique, can prevent such complications^[5]. This case highlights the importance of early diagnosis and timely intervention in preventing long-term disability resulting from post-vaccination injection quadriceps contracture. While the initial management of the abscess was appropriate, the delayed intervention for the contracture likely contributed to the prolonged disability. Early recognition and referral to specialists are essential for achieving the best possible outcomes^[2].

Conclusion

This case report demonstrates the importance of early diagnosis, surgical intervention, and rehabilitation in the management of post-vaccination quadriceps contracture. Through timely surgical management and rehabilitation, the child was able to achieve substantial improvement in knee function and mobility, significantly enhancing her quality of

life. This case also emphasizes the importance of proper and sterile vaccination administration techniques to prevent such complications^[1, 2, 3, 5].

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Conflict of Interest

The authors declared no potential conflicts of interest with regard to the submitted article. Each author certifies that he or she has no commercial associations that might pose a conflict of interest in connection with the submitted article.

Ethical standards

Institutional ethics committee approved the study.

Informed consent was obtained from the participant (legal guardian) included in the study

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