

## Case Report

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# Skin Expander to Enhance Anterior Coverage in Knee Liberation Surgery One Case Report

Le Phuc

Senior Consultant Surgeon of Saigon International Traumatology Orthopaedic Hospital, HoChiMinh City, Vietnam

### ABSTRACT

A female 11 years old, right knee stiffness since childhood. Able walking, but unable running, difficult sitting. Right knee Range of Motion 0-0-3°. Thigh muscle atrophy 2cm. Right lower limb axes well aligned. Rectus femoris muscle very tense, easy to feel under skin. Patella alta, 3 cm above normal position. Skin of anterior knee is in normality, but predictorily when flexion 120°, skin closure is impossible. Nerves and vessels are in normal condition. MRI shows severe contracture of Rectus Femoris. Vastus intermedius, lateralis and medialis are almost normal. Few adhesions inside the joint. Patellofemoral articulation smooth. First operation: placing a 300ml skin expander at prepatellar space, then inflate 300ml water by 10 times. Second operation: remove skin expander, lengthening Rectus Femoris 6 cm. Knee flexion 130°. Easy skin closure. 28<sup>th</sup> postoperative day, closed manipulation was performed under general anesthesia to achieve knee flexion 130°, then knee kept flexed for 2 hours. Knee flexion-extension was crucial exercise in longterm physical therapy. Last examination at 8th month postoperatively: almost normal walking, slight running, Knee Range of Motion 0-0-115°. By this case, presumable conclusion is skin expander may enhance the anterior coverage for the patients in knee liberation surgery.

### Corresponding author

Le Phuc, Senior Consultant Surgeon of Saigon International Traumatology Orthopaedic Hospital, HoChiMinhCity, Vietnam (SaigonITO Hospital). Add 140C Nguyen Trong Tuyen, Ward 8, District Phu Nhuan, HoChiMinh City, Vietnam.

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### Introduction

In the Knee Liberation Surgery, skin coverage over the anterior part of the knee is always challenging problems. The midline incision permits access inside the joint, remove all adhesions. Unfortunately, when knee flexes, skin closure resumes impossible or very difficultly. In some cases, anterior part of knee sustains an acute ischaemia which may result in necrosis. For the patient presented here, a female 11 years old, knee stiffness since childhood, knee ROM 0-0-3°, skin coverage over the anterior part of the knee is much more difficult, Skin Expander creates more skin and soft tissue presumes the solution. Two operations were necessary (first to place skin expander, then inflate to create further skin and soft tissue; second to liberate the knee and close the skin without tension). Furthermore, if postoperative physical therapy can not achieve the full flexion as peroperation, closed manipulation was justified. The final outcomes of this patient are evidences that in some cases of knee liberation, skin expander is useful for anterior coverage.

### Case Report

Patient is a female 11 years old, right knee stiffness since childhood. Able walking, unable running, difficult sitting. Right knee Range of Motion 0-0-3°. Thigh muscle atrophy 2cm. Right lower limb axes well aligned. Only slight recurvatum. Rectus Femoris muscle

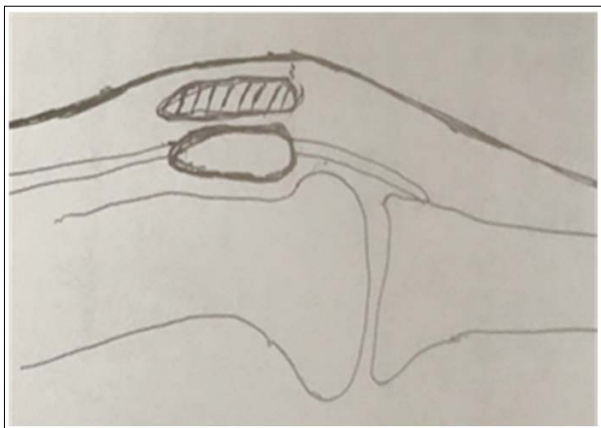
very tense, easy to feel under skin. Patella mobile, but much above normal position. Skin of anterior knee is not elastic enough for knee flexion. Nerves and vessels are in normal condition.

X-Rays and MRI showed severe contracture of Rectus Femoris. Vastus intermedius, lateralis and medialis were almost normal. Patella alta, 3cm higher than normal position. Few adhesions inside the joint. Patellofemoral articulation smooth. Figure 1.



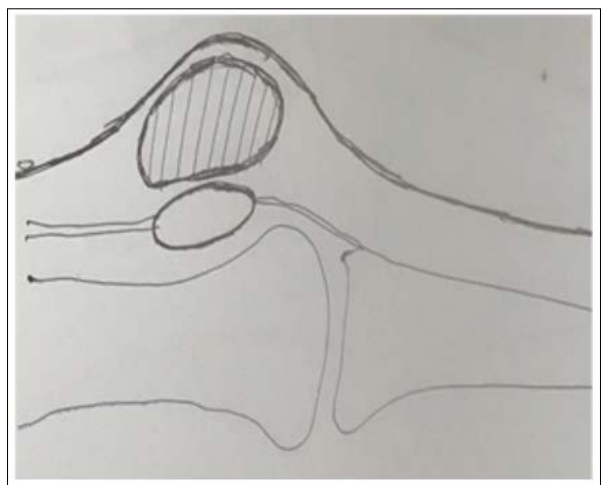
**Figure 1:** X-rays and MRI showed severe contracture of Rectus Femoris; Patella alta 3 cm higher than normal position. Not much intraarticular adhesions. Patellofemoral articulation smooth. The axes well aligned, only slightly recurvated

**First Operation:** Placing a 300 ml skin expander by lateral incision, at prepatellar space. Then inflate 300 ml of water by 10 times (30ml once). Figure 2.



**Figure 2:** A 300ml Skin Expander was placed at prepatellar space, by lateral incision. Then inflate 300 ml of water by 10 times (30ml once)

**Second Operation:** By the old approach removed skin expander, liberated the knee, the Rectus Femoris was lengthened 6 cm. Knee flexion 130°. Easy closure of the anterior knee skin, no tension. Keep knee flexed for 8 hours postoperatively, then gradual relaxation Figure 3.



**Figure 3:** Follow the old approach, remove the skin expander, lengthening Rectus Femoris 6 cm, liberate knee and flexe 130°. Easy closure of anterior knee skin, no tension

#### Closed Manipulation of Knee under General Anesthesia

With strenuous physical therapy, but at 28<sup>th</sup> postoperative day knee ROM achieved 0-0-45°, under general anesthesia knee was manipulated to flex 130° and keep flexed 2 hours. Postmanipulation physical therapy with Flexion-Extension movements has been performed consistently and longterm practices.

Follow-up at month 1,3,6 the result was better and better. Last follow-up at 8<sup>th</sup> month: able walking, slight running, knee ROM 0-0-115°. Able to squat, to ride bicycle Figure 4.



**Figure 4:** Patient at 8<sup>th</sup> month follow-up: Axes well aligned, knee ROM: 0-0-115°. Able walking, slight running, able to squat, to ride a bicycle

#### Discussion

In the knee liberation surgery, the complications of anterior knee skin are always challenging [1-3]. When knee flexes, soft tissues at anterior knee are under tension. Consequency is local ischaemia which may lead to partial or complete necrosis of involved structures [4-7]. Midline approach (after Thompson) or lateral and medial one (after Judet) can not avoid completely these problems In general, majority of patient for knee liberation doesn't need to augment the skin, but in some special cases this technique is justified [7].

If knee at relaxation position (extension), no pressure on the skin and soft tissue of anterior knee. When knee flexes this pressure gradually increases. More flexion, more tension and more risk for skin to be necrotized, and patient is in severe pain. Sometimes this tension pain makes liberation surgery failure [1-6].

To overcome the complications, using skin expander to enhance the anterior coverage may be a useful measure.

#### Conclusion

Skin Expander to be placed before the patella to augment the skin and soft tissue enhance the anterior coverage for the knee in liberation surgery is a measure effectively for knee to achieve full flexion and extension without tension. This technique may be used for patient whose skin of anterior knee are so lacking, unflexible, unable to cover the knee from anterior, provides a knee functional as expected as possible.

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