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Functional outcome of judet's quadriceptoplasty in posttraumatic stiff knees.

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ABSTRACT... Objective: To evaluate functional outcomes of Judet's Quadriceptoplasty in posttraumatic stiff knees according to Judet's criteria and Hospital for special surgery score of knee. **Study Design:** Retrospective Cohort Study. **Setting:** Ghurki Trust Teaching Hospital, Lahore, Pakistan. **Period:** January 2015 to June 2017. **Material & Methods:** 74 patients 61 males and 13 female with stiff knees underwent Judet's Quadriceptoplasty and followed by 12 weeks of aggressive rehabilitation and followed by aggressive rehabilitation for 12 weeks. Range of motion was measured with goniometer at last follow up. Outcomes were measured in terms of Judet's criteria and Hospital for special surgery score of the knee. **Results:** Mean age at time of operation was 33.70 ± 10.66 years. According to Judet's criteria 68.9% (51) patients have excellent range of motion, 21.6% (16) have Good, 6.8% (5) patients have fair, 2.7% (2) have poor outcome. According to Hospital for special surgery score of the knee (HSS) mean score was 86.68 ± 5.92 (60-96). There were 83.8% (62), 13.5% (10) and 2.7% (2) cases in excellent, good and fair group respectively. Blood loss was minimum 250ml max 650ml mean 443ml. **Conclusion:** Judet's quadriceptoplasty for knee extension contracture is a useful procedure to increase the range of motion of stiff knees.

Key words: Extension Contracture, Judet's Quadriceptoplasty, Range of Motion.

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INTRODUCTION

Extension contracture of knee is very disabling condition. Unlike wrist, tarsus and ankle joint extension contracture of knee can neither be masked nor compensated by adjacent joints. Even a minor degree of extension contracture can lead to social problems like difficulty in squatting and kneeling which is common in Asian society. Patients face impediment in their occupational and recreational activities which require various degree of knee flexion. It is also a reason of constant embarrassment for the patient due to fall of people on their outstretched leg in public transport and theatres.¹⁻³

Posttraumatic knee stiffness is usually a consequence of distal femur, proximal tibia or patella fractures. The stiffness/contracture occurs due to either intra-articular or extra-articular

adhesions or a combination of both. Intra-articular adhesions form due to excessive scar tissue formation within joint after an intra-articular fracture and at times due to bony impingement of an articular malunion.^{1,4,5} On the other hand, extra-articular adhesions occur due to tethering of quadriceps muscle and surrounding fascial structures to the callus at fracture site with resultant shortening of these structures. The predominant mechanism of contracture is dependant on the nature of injury.^{1,4-6}

Over the last half century, various open and arthroscopic methods have been proposed for treatment of posttraumatic knee stiffness including arthroscopic adhesionolysis. Thompson Quadriceptoplasty and Judet's Quadriceptoplasty. To maintain range of motion achieved intraoperatively, adequate post-

operative pain control and physiotherapy are mandatory.^{2,7-12} Judet's technique involves sequential and controlled release of structures limiting knee flexion till desired joint range of motion is achieved. Consequently, there is no extension lag or weakness of knee extension mechanism which is common with Thompson Quadriceptoplasty.^{9,13} We conducted this study to determine functional outcome of Judet's Quadriceptoplasty in patients with posttraumatic stiff knee joints according to Judet's criteria and Hospital for special surgery score of the knee (HSS).

MATERIAL & METHODS

This was a retrospective case series of 74 patients operated between January 2015 and June 2017 at Department of Orthopedics and Spine Surgery, Ghurki Trust Teaching Hospital. Indication of surgery was stiff knee having range of motion 0-40° or less. Patients having non-union at fracture site, pin site infection or co-morbidities (DM, IHD, psychological problems) were excluded. Permission was taken from hospital ethical committee. Patients were informed about procedure and objective of the study and informed written consent was taken. Supervised rehabilitation was done in all patients for 12 weeks. At last follow patients were assessed for range of motion, pain, stability, function, flexion deformity and functional outcome was classified as excellent, good, fair and poor according to Judet's Criteria and Hospital for special surgery score of the knee. Judet's score is graded as excellent, good, fair and poor when range of motion is more than 100, 100-80, 80-50 and less than 50 respectively. Hospital for special surgery score of the knee (HSS) has 100 points in total in which there 30, 22,18,10,10 and 10 points for pain, function, range of motion, stability, and flexion deformity and muscle strength respectively. Hospital for special surgery score of the knee is graded as: excellent >85 points, good 70-84 points, fair 60-69 points and poor < 60 points.

A predesigned questionnaire was used to collect information on clinic-demographic profile, cause of injury, preoperative and post-operative knee

range of motion. Variables pertinent to Judet's score and Hospital for Special Surgery score were also noted. Data was entered and analyzed by using SPSS version 21. Frequency, mean and standard deviation was calculated for gender, age, range of motion and blood loss.

Operative Procedure

Judet's Quadriceptoplasty was performed as originally described by Judet's⁹, Daoud⁶ and most recently by A. Masse¹³ at stiff knee joint under spinal anesthesia. Procedure was started with 8-10cm anteromedial incision which was used to release medial retinaculum and intra-articular adhesions. Thereafter a second incision over antero-lateral aspect of femur was made to remove adhesions in the supra-patellar pouch. Vastus lateralis and intermedius are completely released from linea aspra. At this stage range of knee flexion is checked. In case of residual tightness due to rectus femoris, it was released from anterior inferior iliac spine by a separate incision. Electric cautery was judiciously used. All incisions were closed over suction drain after meticulous hemostasis. Postoperatively, knee and hip joints are kept flexed at 90° on box frame. Passive range of motion was started at 2nd or 3rd post-operative day under adequate analgesia when drains are removed. Weight bearing was started as soon as tolerated by the patient.

Physiotherapy was started and continued for at least 12 weeks. Instructions were given to the patients by physiotherapist during hospital stay and in written form for further therapy. Knee was immobilized in maximum flexion at night time for three weeks. At last follow up functional outcomes of Judet's Quadriceptoplasty was assessed according to Judets criteria and Hospital for special surgery score of knee (HSS).

RESULTS

A total of 74 patients including 61 males and 13 females with a mean age of 33.7 ± 10.65 years were included. Male to female ratio was 4.6:1. Average perioperative blood loss was 443 ± 105.11 ml. Mean follow up was 21.37 ± 10.26459 months.

According to Judet's criteria there were 84.2%

(61), 12.2% (9), 4.1% (3), 1.4% (1) patients in excellent, good, fair and poor category respectively. According to Hospital for special surgery score of the knee (HSS) mean score was 86.68 ± 5.92 (60-96). There were 83.8% (62), 13.5% (10) and 2.7% (2) cases in excellent, good and fair group respectively.

There were 5 cases which develop complications including one patellar fracture, one tibial tuberosity avulsion and two superficial infections and one deep infection. Patellar fracture was treated successfully treated with tension band

wiring. Tibial tuberosity avulsion was fixed with screw. All infections were treated with antibiotic according to culture and sensitivity.

Age	33.7 ± 10.65 (range 20-60)
Gender	
Male	61 (82.4%)
Female	13 (17.6)
Side	
Right	40(54.1%)
Left	34(45.9%)

Table-I. Patient's demographics. (n,%)

	Judet et al	Jaleel et al	Wang J-H et al	Kim liu et al	Smerdelj M et al	Our Results
Judet's Score (%n)						
Excellent		33.3%(11)	72.7%(16)		4.18%(2)	84.2%(61)
Good	85% (45)	42.5%(14)	22.72%(5)		41.8%(20)	12.2%(9)
Fair		12.1%(4)	4.54%(1)		48.68%(22)	4.1%(3)
Poor		12.1%(4)	-		8.34% (4)	1.4%(1)
HSS*			94 %	91%	68.83%	86.68%

Table-II. Post-operative results and comparison with literature.

*Hospital for special surgery score of knee.

DISCUSSION

Although modern fracture management techniques allow for early knee range of motion, post-traumatic knee stiffness is still prevalent after peri-articular fractures of distal femur, proximal tibia or patella.¹⁴ Treatment of severe stiff knees unresponsive to manual or arthroscopic procedures remains a challenging problem.

Although post-traumatic knee extension contracture can occur due to variety of reasons, the predominant pathology is adhesion between the extensor mechanism and the femur which may occur within the joint itself, outside or both.¹⁵ Common situations include femoral shaft fractures associated with quadriceps femoris injury, prolonged immobilization of the knee by casting or external fixation or pain in the knee due to fractures around the knee.¹⁶ Consequently, patients with knee extension contracture can usually ambulate without aids but cannot either flex the knee or experience pain with knee flexion.

Quadriceptoplasty is usually recommended for patients with severe knee extension contracture.

Varying degree of knee flexion is required for activities of daily life as well as occupational or leisure activities. Knee flexion of less than 70° hampers the normal gait of the patient and produces limp.¹⁷ It has been shown that normal gait requires 70°, climbing stairs requires 840 and standing from sitting position requires 930 of knee flexion.

The usual culprits that block knee flexion are the fibrosis and shortening of para-patellar retinaculum, adhesions between patella and femur and fibrosis of the vastus intermedius with overlying rectus femoris muscle and underlying femur shaft resulting in shortening of the rectus femoris.^{4,6,9,13} The Judet's technique of sequential release of tight structures is associated with rapid recovery and almost complete maintenance of knee flexion achieved intraoperatively.¹⁸ Consequently, there is no extension lag or weakness of knee extension mechanism which is common with Thompson Quadriceptoplasty.

Judet et al⁹ reported 53 cases with 85% (45 patients) excellent results. Ali et al¹⁷ in their

series of 10 patients treated by Judet's technique reported 20% (2), 70% (7) and 10% (1) patients with excellent, good and fair functional outcomes respectively. Wang et al¹⁹ also operated 22 patients by their innovative technique and achieved excellent results in 20 knees (90.9%). In series by Jaleel et al¹, twenty five out of 33 patients (75.8%) achieved 80 degree flexion and therefore were classified as either good or excellent according to Judet's criteria with patients 33.3% (11) graded as excellent, 42.5% (14) good, 12.1% (4) fair and 12.1% (4) poor. Wang J-H et al²⁰ in their retrospective analysis of minimal invasive quadriceptoplasty of 22 cases, there were 16, 5 and 1 cases in excellent, good and fair group respectively and mean HSS score of 94 point. Kim Liu et al²¹ also reported an improvement from 62 points preoperative to 91 postoperatively in their series of minimal invasive quadriceptoplasty. Smerdelj M et al²² in their series have 4.18%, 41.8%, 48.68% and 2.07% in excellent, good, fair and poor group of patients respectively. Mean HSS was 68.83% and 70.06% for study and control group respectively. In the present study, 68.9% (51) patients have excellent range of motion, 21.6% (16) have good, 6.8% (5) patients have fair, 2.7% (2) have poor outcomes. According to Hospital for special surgery score of the knee (HSS) mean score was 86.68 ± 5.92 (60-96). There were 83.8% (62), 13.5% (10) and 2.7% (2) cases in excellent, good and fair group respectively. Our results are comparable to national literature and slightly inferior to international results. This difference might be due to patient demographics.

CONCLUSIONS

The results of present study has shown that Judet quadriceptoplasty can be considered a successful salvage procedure for severely stiff knees after fractures around knee. Furthermore, this procedure was associated with low incidences of extension lag after preexisting quadriceptoplasty. The surgical procedure is relatively simple and has low complication rate. The technique is versatile and can be tailored to individual needs. We recommend this technique as a useful procedure to increase the range of motion of stiff knees. Physiotherapy is the main

stay in the post-operative management not only in gaining maximum flexion but also in regaining active extension.






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2	Shehzad Ahmad	Collected data and references.	
3	Irfan Qadir	Collected references and discussion writing.	
4	Abaidurrehman	Collected data and references.	
5	Atiq Uz Zaman	Collected references and writing operative procedure.	
6	Amer Aziz	Critical analysis of article and final approval.	