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Short Report:

Reanalysis of Agelietti Procedure (A Method of Corrective Supracondylar Femoral Osteotomy)

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Abstract: Objective: Supracondylar femoral osteotomy is the time tested method, used for correcting the angular (varus & valgus) deformities at the knee. Traditionally, Coventry type of osteotomy where a medial or lateral based wedge of bone is removed or an open wedge osteotomy is made & the space filled with bone graft, is done to achieve the desired correction. This osteotomy is subsequently stabilized with Kirschner wires or plates & screws. Later the limb is externally supported in brace or plaster cast. Here we present a case series of 10 cases, where we have analyzed the efficacy of Aglietti procedure, as a method of femoral supracondylar osteotomy for correcting the valgus deformity at the knee. **Methods:** Ten valgus adolescent knees were operated in 7 patients by following the Aglietti procedure for correcting the angular deformity at the knee. The results were analyzed taking into consideration the operating time, blood loss during surgery estimated by the number of surgical mops used, stability of the osteotomy in the post-operative period & ultimate range of motion (ROM) obtained at the end of 6 months after the surgery. **Results:** The average age of patients dealt with was 12.6 years (n=7) with females predominating (n=5) against 2 males. The average time was 47.5 minutes. The average size of the surgical mops used was 15x20 cms. Surgical mops used per patient were 1.6. The average range of flexion achieved at the end of 6 months after surgery was 131.45 degrees (Rounded average to a measurable value being 131 degrees). **Conclusion:** In our case series we found Aglietti procedure as an effective method to correct the valgus deformity in adolescent knees. Supracondylar femoral osteotomies are not only for varus an valgus corrections; this osteotomy is used as well for rotation correction and flexion and extension correction, mainly in CP patients. But we used the Agelietti procedure for the correction of angular deformities(varus/valgus) in patients of nutritional rickets. However more number of cases need to be done to make a final conclusion of establishing the superiority of this method over other methods.

Key Words: Aglietti procedure; Supracondylar femoral osteotomy; Valgus knee

Introduction:

Supracondylar femoral osteotomy is one of the most commonly performed procedure to correct the angular deformities at knee due to varied etiologies. Worldwide Coventry(1-5) method of supracodylar femoral osteotomy is widely prevalent where focus is on to remove or create a wedge of bone using bone graft, enough to correct the deformity. There are other various forms of similar procedures available, described by different authors for correcting the valgus or varus deformities at the knee. Here, we analysed the efficacy of the Aglietti procedure(6) in correcting the valgus deformity in adolescent post-rachetic patients with a good functional outcome.

Aim: To analyze the efficacy of Aglietti procedure for correcting the valgus deformity at knee in terms of operating time, per-operative blood loss, efficacy of stability of osteotomy, starting of post operative rehabilitation & functional outcome in relation to final range of motion (ROM) – flexion after 3 months of surgery.

Materials and Methods:

Ten adolescent valgus knees (3 patients with bilateral knee deformity & 4 patients with unilateral knee deformity) were selected for the procedure. The patients attended the out patient department of Orthopedics & trauma at NEIGRIHMS, Shillong. The cause of the deformity was found to be post ricketic in all the patients. Those who presented with active rickets were treated with vitamin D & calcium supplementation. The outcome of the treatment was followed up with serial serum calcium & bone specific alkaline phosphatase levels & radiological evidence of healing of rickets with occurrence of zone of provisional calcification in the metaphysis. Simultaneously, co-existing anemia was also treated, if present. Anemia was found co-existing in 4 patients, since the nutritional deficiency is quite prevalent in the north-eastern part of India. Preoperative scanogram of the lower limbs was performed to assess the desired valgus correction (average 6 degrees valgus at knee in bilateral cases & similar to the other knee in unilateral cases). Patient was placed in supine position and all the operations were performed under general anesthesia & with upper thigh tourniquet in place. A 5 cm. long medial paramedian incision was made in line with the medial margin of patella. Superficial & deep fascia was incised. The distal femur was exposed subperiosteally by following the interval behind the medial margin of vastus medialis muscle (subvastus). Growth plate was identified by the leash of epiphyseal vessels & firm adherence of periosteum & confirmed finally by the image intensifier. Drill holes were made in the medial cortex in the V-fashion in sagittal plane with the apex of V proximal to the growth plate. Osteotomy was completed by osteotome after joining the drilled holes. The bony cortical apex at the medial side of this V was removed with bone-nebular or rongeur. The medial angular displacement was done in coronal plane to achieve the desired correction. Fi-

nally, the osteotomy was stabilized using bone staples. Wound was closed in layers. Wound drain was inserted & inflated & the limb was subsequently immobilized in the above knee plaster of Paris cylinder cast. Post operative antero-posterior & lateral radio graphs of the knee showing the V shaped osteotomy fixed with staples have been shown below (Figs 1 & 2). Postoperative wound inspection was done at 5th postoperative day & suture removal thereafter at 14th day. There was no wound discharge & all wounds healed well. At 6 weeks, postoperative radiographs were repeated (Figs 3 & 4) to rule out any change in the alignment or loosening of staples. Once they were ruled out, rehabilitation in the form of active & active assisted range of motion of knee started in brace which was discontinued at 3 months when all osteotomies found united. The final assessment of range of motion was done at the end of 6 months after surgery.

Figs. 1 and 2: Post operative antero-posterior & lateral radiographs of the knee showing the V shaped osteotomy fixed with staples

Results:

The average age of patients dealt with was 12.6 years (n=7) with females predominating (n=5) against 2 males. The average time was 47.5 minutes. The average size of the surgical mops used during surgery was 15x20 cms. The number of the surgical mops used per patient was 1.6. The average range of flexion of the knee achieved at the end of 6 months was 131.45 degrees (Rounded off to the nearest measurable value of 131 degrees). The data distribution of the patients in the study is shown below in the Table)

Table showing data distribution of patients

Patient No.	Age (years)	Sex	Operating time (min.)	No. of mops used	Post 6 months ROM (flexion in degrees)
1	16	F	40	1	0-125
2	14	F	45	2	0-125
3	15	F	40	1	0-130
4	16	M	40	1	0-135
5	12	F	50	2	0-135
6	13	M	45	2	0-135
7	12	F	50	2	0-135

Discussion:

Deformity correction is required when the valgus deformity at the knee is more than 12-15 degrees or the plane of the knee joint deviates from horizontal by more than 10 degrees. Coventry method of distal femoral osteotomy is widely practiced through out the world. Here a wedge of bone is removed from distal femoral metaphysis based on the measurement on preoperative roentgenograms, to achieve desired correction of the angular deformity. Subsequently it is fixed with internal fixation device using plates & screws or crossed K-wires. Similarly various such procedures are described by various authors like Mc Dermott et al(7), Healy et al(8,9) and Debeyre et al.(10) We analyzed in our case series Aglietti procedure of supracondylar femoral osteotomy which was described in 1987. In their method, Aglietti etal. described a supracondylar femoral osteotomy in which the osteotomy is V – shaped in the sagittal plane with its apex just superior to the femoral condyles. They believed this osteotomy has advantages that no internal fixation is needed & alignment can be adjusted in the postoperative cast. We performed the same procedure in case of adolescent patients with valgus deformity of the knee. However, we used titanium staples as the supplemental mode of internal fixation which was easy to use, less time consuming & a dependable method for achieving additional stability at the site of osteotomy. The results obtained in our short series of 10 cases in relation to the total time required for the procedure, average per-operative blood loss & subsequent recovery of range of motion of the knee, are quite encouraging.

Conclusions:

We conclude that the Aglietti procedure of supracondyar femoral osteotomy is a noble method & can be more widely used to achieve correction of valgus deformity of knee in adolescent post-rachetic patients. This small case series has used a simple methodology of assessing the final outcome of the procedure by deformity correction and establishing good functional range of motion of the knee. The aim was to highlight the basic procedure which can be performed easily and does not require a specialized set up and can easily be practiced, with minimal internal stabilization of the osteotomy using bone staples and plaster of paris application, for the correction of the angular deformities of the knee . Not much literature is available on this easy to do procedure and so further evaluation is required to assess it's efficacy in such deformities.

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