Results of Supracondylar "V" Osteotomy for the Correction of Genu Valgum Deformity

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Abstract

Background: Medial close wedge, lateral open wedge, dome and "V" osteotomies are the commonly to correct the genu valgum (GV) deformity. However, the ideal method for the correction of coronal plane deformity is controversial. This prospective study is to evaluate the functional and radiological result of supracodylar "V" osteotomy to correct GV deformity. **Materials and Methods:** "V" osteotomy was done in all patients with clinically significant GV deformity and was fixed with crossed K-wires. Weight-bearing mobilization was started after radiological union. Patients were evaluated for correction in different clinical and radiological parameters. The function of the knee was assessed by Bostman's score. The subjective score was used to assess the parent's satisfaction after the procedure. **Results:** 187 limbs with genu valgum deformity (47 males and 71 females) were included in this study. We observed a significant improvement in the mean intermalleolar distance, clinical and radiological tibiofemoral angle and lateral distal femoral angle, from 17.3 to 3.9 cm, 23.8°to–4.5°, 25.6° to 6.1°, 76.6° to 88.4°, respectively. The mean Bostman score improved from 20.6 to 28.1. The parent's satisfaction assessed subjectively was 95.3 points. **Conclusion:** This osteotomy along with the fixation with K-wires is a safe, effective, reproducible technique with a short learning curve and a procedure requiring no repeat surgery for implant removal, with good functional results, and without major complications.

Keywords: *Bostman score, genu valgum, supracondylar "V" osteotomy*

Introduction

Deformities around the knee are a common disorder encountered by an orthopedician.[1] Nutritional ricket is one of the leading causes of these deformities in developing countries.[2] These deformities may originate from distal femur, proximal tibia or the knee joint depending on the pathophysiology.[1,3,4] If untreated, altered biomechanics of the knee lead to problems such as anterior knee pain, patellofemoral instabilities and gait abnormalities, and early osteoarthritis.[4] A large numbers of corrective osteotomies have been described for genu valgum (GV) arising from distal femur-like lateral opening wedge, medial closing wedge, dome osteotomy, wedgeless spike, and "V" osteotomy, with few advantages of one over the other.[5-15] Still, there is a dilemma regarding the most accepted osteotomy for coronal plane deformity around the knee.

The supracondylar "V" osteotomy was originally described by Aglietti *et al.* primarily to change the line of weight transfer in osteoarthritic knees of older population.[5] However, to the best of our knowledge, very few studies have been identified in the literature regarding its effectiveness in an adolescent valgus knee.[16,17] We found this technique of osteotomy, and fixation with K-wires and casting as a safe, effective, with a short learning curve and a procedure requiring no repeat surgery for implant removal. We prospectively evaluated the result of this osteotomy in 118 adolescent patients (187 limbs) with minimum 2 years of followup.

Materials and Methods

We conducted a prospective study at our institute, a tertiary pediatric orthopedics referral center, in between May 2012 and April 2014 with at least 2 years of followup. We included patients who qualified the inclusion criteria. The inclusion criteria were as follows (1) unilateral or bilateral GV having tibiofemoral angle (TFA) more than 15° and intermalleolar distance (IMD) in standing position, more than 10 cm for bilateral and 7 cm for unilateral deformity; (2) age between 13

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and 25 years; (3) origin of deformity primarily in distal femur; (4) no active metabolic abnormality; (5) in whom hemiepiphysiodesis is unpredictable; and (6) consent to participate in the study. Patients who had severe collateral ligament instability, unstable knee with evidence of subluxation, restricted knee movements, predominantly tibial deformity, epiphyseal irregularities, and evidence of active metabolic disease were excluded from the study.

Patients were evaluated clinically in the outpatient department and were further evaluated by radiological and biochemical analysis. The investigations included serum and urine calcium/phosphate, serum alkaline phosphatase, serum parathormone level, serum vitamin D3 and renal function test. Any metabolic abnormalities, if found were treated first before proceeding for corrective surgery.

The knee flexion test was done to assess the origin of deformity. The IMD was measured while in standing position with the knee extended, and the medial surface of the knee touching each other and patella facing forward [Figure 1]. The TFA was calculated as the angle subtended between the line drawn from ipsilateral anterior superior iliac spine (ASIS) to the center of patella and from center of patella to the center of the ankle joint. Preoperative Bostman score [Table 1] was also calculated to assess the function disability.

A standing anteroposterior radiograph was taken including both hips, both knees with patella facing forward and both ankles to measure the angles to quantify the deformity. The radiological TFA was measured as the angle formed between the anatomical axes of femur and tibia. The lateral distal-femoral angle (LDFA) was calculated as the lateral angle between the mechanical axis of the femur and the articular surface of the distal femur [Figure 2]. The medial proximal tibial angle was calculated as the medial angle between the tibial mechanical axis and the articular surface of the proximal tibia. We have also evaluated, if there is any changes in joint orientation with respect to the horizontal axis.

The outcome was evaluated regarding clinical (IMD and TFA) and radiological (TFA and LDFA) parameters. Functional assessment was quantified on the basis of the Bostman score. The parent’s satisfaction was assessed subjectively.

Operative procedure

The procedure was performed in supine position and under high groin tourniquet control. Utmost care was taken while draping that ankle should be free and ASIS was marked using electrocardiography lead to see the alignment during correction. Knee flexed and “figure of 4” was made. A medial longitudinal skin incision of size 6–8 cm long was made from 1 cm distal to 5–7 cm proximal of adductor tubercle in the line of femoral shaft [Figure 3a]. The deep

Figure 1: Clinical photograph of a patient with bilateral genu valgum. Her intermalleolar distance was 17 cm measured in standing position with both patella facing forward and knee touching each other

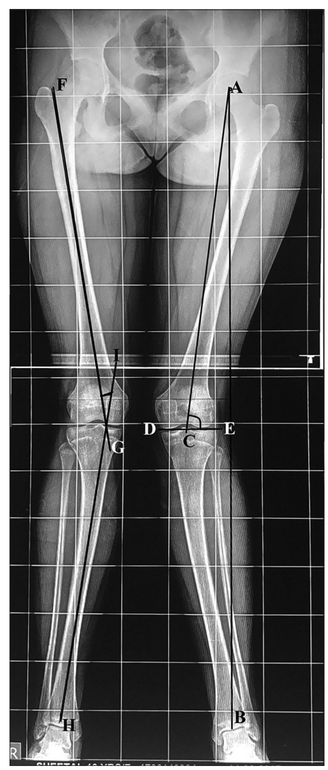

Figure 2: Antero-posterior radiograph of bilateral hip, knee and ankle showing different angle measurements. Line AB = Mechanical axis of the lower limb; AC = Mechanical axis of femur; DE = Articular surface of distal femur; FG = Anatomical axis of femur; HI = Anatomical axis of tibia. Tibiofemoral angle = Angle between line FG and line HI; lateral distal femoral angle = Angle between line AC and DE

Table 1: Description of clinical grading scale of Bostman

Variable	Points
Range of movement (ROM)	
Full extension and the ROM >120° or within 10° of the normal side	6
Full extension, movement 90° to 120°	3
Pain	
None to minimal on exertion	6
Moderate on exertion	3
In daily activity	0
Work	
Original job	4
Different job	2
Cannot work	0
Atrophy, difference of circumference of thigh 10 cm proximal to the patella	
<12 mm	4
12-25 mm	2
>25 mm	0
Assistance in walking	
None	4
Cane part of the time	2
Cane all the time	0
Effusion	
None	2
Reported to be present	1
Present	0
Giving way	
None	2
Sometimes	1
In daily life	0
Stair climbing	
Normal	2
Disturbing	1
Disabling	0
Total score	
Excellent	30 to 28
Good	27 to 20
Unsatisfactory	<20

fascia was identified and incised in line with the incision. Vastus medialis was identified and elevated anteriorly. The epiphyseal vessels were identified traversing transversely just proximal to adductor tubercle [Figure 3b]. The periosteum was incised and elevated till before epiphyseal vessels. The osteotomy site was identified around 0.5 cm proximal to epiphyseal vessels. The osteotomy was "V" shaped in the frontal plane, with anterior arm slightly longer than the posterior arm with both arm perpendicular to each other [Figure 3c]. Multiple drill holes using 2.5 mm drill bit was made along the marked arm, then osteotomy of the medial, anterior, and posterior cortex were completed

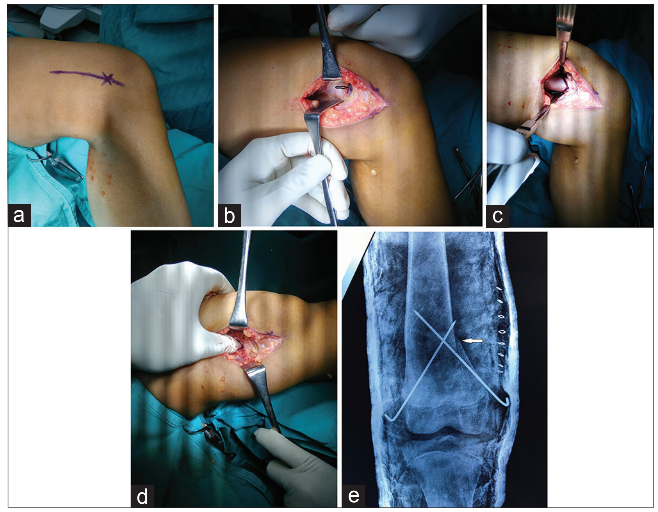

Figure 3: (a) Showing planned incision. X = adductor tubercle. (b) Exposure of distal femur after lifting vastus medialis anterior. Arrow shows epiphyseal vessels crossing transverse in the distal femur. (c) Showing planned osteotomy proximal to epiphyseal vessels. It is to be noted that anterior limb of the osteotomy is longer than the posterior. (d) Intraoperative picture showing how telescopy of proximal medial cortex was done in distal medial cortex was attempted with the help of thumb. (e) Immediate postoperative anteroposterior radiograph of knee showing osteotomy and its fixation with two cross K-wires. Arrow shows telescopy of proximal fragment into distal fragment

with the help of osteotome. Knee was then extended and to correct the deformity a gentle varus force was applied telescoping the medial cortex of the proximal fragment into wider distal metaphyseal segment [Figure 3d]. Sometimes, if we failed to correct it by varus force, simple valgus thrust was given just to break the lateral cortex and whole sequence was re-attempted. The lateral cortex usually did not open because of intact lateral periosteum. The intraoperative alignment was checked by clinical TFA and was tried to keep in between 0° and 8°. Intraoperatively, correction was assessed using the cautery wire to check the alignment radiographically from center of hip to ankle so that the cautery wire overlaps the medial compartment of the knee (Zone I) as assessed under C-arm. The frontal plane deformity of <15° was also corrected by flexing or extending at the osteotomy site. Finally, the osteotomy was fixed using usually with two-crossed K-wires [Figure 3e], and more K-wires were also inserted if stability was doubtful. Then, tourniquet was released, hemostasis achieved, and closure was done over a negative pressure suction drain. The cylindrical plaster of Paris cast was applied from high groin to 4 cm above ankle joint.

Postoperative protocol

Drain was removed after 24–48 h through the window made in the cast over the incision site, and first postoperative aseptic dressing was done. Patients were discharged accordingly and advised to followup in outpatient department after 2 weeks for stitch removal. K-wires were removed at 8 weeks cast was reapplied till union of the osteotomy site. Patient was allowed to walk partial weight bearing with the help of axillary crutches at this point. Cast was continued till union was evident on radiological analysis in subsequent followup and then gradual full weight bearing was allowed. Patients were then followed quarterly and assessed clinically [Figure 4].

On final followup at 24th months, IMD, clinical and radiological TFA, and LDFA were calculated. Patients were also evaluated for the knee score as suggested by Bostman *et al*., with score between 28 and 30 were classified as excellent outcome, score between 20 and 27 was good, and a score below 20 was classified us unsatisfactory. The parents' satisfaction was also estimated subjectively.

Statistical analysis

Mean, standard deviation, and range was calculated for each demographic variable such as age, weight, height, duration of hospital stay, and amount of blood loss. The student's *t*-test was applied to analyze the difference between the mean of IMD, TFA, and LDFA values obtained preoperatively and postoperatively. The correlation between the possible variables was also obtained by correlation-regression analysis. A two-tailed $P < 0.05$ was considered statistically significant.

Results

During the period of study, total 152 patients underwent this procedure for the correction of GV. Of which, 28 did not give consent to participate, and 6 were lost to followup till 24 months and hence excluded from the study. Finally, the study was carried out on 118 patients and 187 limbs. There were 68 patients with bilateral and 51 with unilateral involvement (total 97 right and 90 left). There were 47 males and 71 females. The mean age, weight, height, and body mass index (BMI) of our patients were 15.8 years (range 13–21 years), 71.7 kg (range 56–89 Kg), 162.4 cm (range 149–173 cm), and 27.2 kg/m^2 (range 19.4–33.9 kg/m^2), respectively. The deformity was the main symptom in the majority of the patients (n = 89), pain in 19, and gait abnormality in 10. Out of 118, 88 were idiopathic, and 30 showed evidence of healed rickets. The average duration of surgery, blood loss, and duration of hospital stay per procedure was 45.7 min (range 30–70 min), 46.3 ml (range 30–80 ml) and 4.3 days (range 3–7 days), respectively. The mean duration of union of the osteotomy site and followup was 15.2 weeks (range 8–24 weeks) and 27.7 months (range 24–36 months), respectively [Table 2].

The mean preoperative IMD was 17.3 cm (range 12–24 cm) which improved significantly after treatment to average value of 3.9 cm (range 2–7 cm) (P = 0.03) [Table 3]. It was also noted that preoperative IMD had a positive correlation with height (r = 0.4;P = 0.02) and BMI (r = 0.5; P < 0.001)

Figure 4: Clinical photograph of the patient after full correction. Inset shows radiograph after final correction

Table 2: Demographic details

Parameters	*n*	Mean±SD	Range
Age (years)	118	15.8±1.6	13-25
Weight (kg)	118	70.9±7.2	56-89
Height (cm)	118	162.6±4.9	149-173
BMI	118	26.8±2.5	17.4-33.9
Duration of surgery (min)	187	45.7±6.7	30-70
Blood loss (ml)	187	46.3±7.7	30-80
Hospital stay (days)	187	4.4±0.7	3-7
Bostman score (preoperative)	187	20.6±1.4	18-22
Bostman score (postoperative)	187	28.1±0.6	26-30
Parents' satisfaction	118	95.3±1.1	92-99
Union time (weeks)	187	15.2±3.8	8-24
Followup (months)	118	27.7±3.3	24-36

BMI=Body mass index, SD=Standard deviation

Table 3: Comparison between preoperative and postoperative clinical and radiological parameters

Parameters	Preoperative	Postoperative	*P*
IMD (*n*=118)	17.3±2.3 (12-24)	3.9±0.7 (2-7)	0.03 (<0.05)
CLTFA (*n*=187)	23.8±2.2 (18-33)	4.5±0.8 (3-8)	0.001 (<0.05)
RadTFA (*n*=187)	25.6±2.3 (19-36)	6.1±0.8 (4-12)	<0.001
LDFA (*n*=187)	76.6±2.1 (70-82)	88.4±0.6 (86-90)	<0.001
Boatsman score (*n*=187)	20.6±1.4 (18-22)	28.1±0.6 (26-30)	<0.001

IMD=Intermalleolar distance, RadTFA=Radiological tibiofemoral angle, LDFA=Lateral distal-femoral angle, CLTFA=Clinical tibiofemoral angle whereas this correlation disappeared after correction of the deformity (P = 0.7 and P = 0.8, respectively) [Table 4].

Mean preoperative clinical TFA was 23.8° (range 18°–33°) and its improvement was significant after correction with mean value of 4.5° (range 3°–10°) (P < 0.001). Similarly, radiological TFA also improved significantly from mean preoperative value of 25.6° (range 19°–36°) to mean postoperative value of 6.1° (range 4°–12°) [Table 3]. On correlation with demographic variables preoperative clinical and radiological TFA were found to be correlated with weight (r = 0.4; P < 0.001) and BMI (r = 0.5; P < 0.001) not with the height (P = 0.6). However, its correlation vanished after correction [Table 4].

Mean preoperative LDFA was 76.6° (70–82) which improved significantly after correction to the mean postoperative value of 88.4° (range 86°–90°) (P < 0.001) [Table 3]. A significant correlation was found in between preoperative LDFA and height (r = 0.3; P = 0.001) and BMI (r = 0.3; P < 0.001) but not with weight. This correlation vanished after correction [Table 4].

Change in joint orientation was found insignificant from mean value of 0.3° (0–2) to–2.5° (2–6) (P = 0.4).

The mean Bostman score improved significantly from 20.6 (18–22) to 28.1 (26–30), and only six patients (4 limbs) had good score (20–27) and the rest had excellent score (28–30) [Tables 2 and 3] The factors which were found to be associated with the Bostman score were weight (r = −0.2; P = 0.02), height (r = −0.2; P = 0.01), postoperative clinical TFA (r = −0.2; P = 0.01) and postoperative LDFA (r = 0.2; P < 0.008). Hence, it can be inferred that tall, overweight, more residual apparent TFA are the factors responsible for poor Bostman score. Similarly, parents satisfaction assessed subjectively, it was found that tall, overweight, more preoperative and postoperative IMD are the factors responsible for poor patients satisfaction [Table 5].

Complications

Osteotomy site became unstable, and hence, four K-wires were required to stabilize it in three limbs [Figure 5]. However, the final result was uneventful. Plaster sore was seen in 11 limbs, which improved after removal of cast. Hypertrophic scar was observed in six limbs. Seven limbs developed superficial infection which was treated by oral antibiotics. Two limbs developed deep infection responded well to debridement and injectable antibiotics. One patient developed K-wire site infection which improved after wires removal [Figure 6]. One patient developed common peroneal neuropraxia, which recovered after 3 weeks. On retrograde analysis, this patient had maximum TFA (33°) which was corrected to 5°. When neuroprexia was observed, the cast was removed and TFA was increased to 12°, and this deformity was accepted. After this incidence, we started two stage corrections in the patient with TFA more than 25° to avoid nerve stretching. Initial 15° of correction is done during index surgery, and the remaining deformity is corrected by manipulation under sedation and change of cast. None had complications such as knee stiffness, recurrence of deformity, or nonunion at the osteotomy site.

Table 4: Correlation between clinical and radiological parameters with demographic variables

Parameters	Height	Weight	BMI
Pre-IMD	r=0.5; P=0.02 (<0.05)	r=0.02; P=0.1	r=0.5; P<0.001
Post-IMD	r=0.09; P=0.3	r=0.03; P=0.7	r=0.02; P=0.9
Pre-CLTFA	r=0.03; P=0.6	r=0.4; P<0.001	r=0.4; P<0.001
Post-CLTFA	r=0.02; P=0.7	r=0.2; P=0.8	r=0.01; P=0.8
Pre-RadTFA	r=0.04; P=0.6	r=0.4; P<0.001	r=0.4; P<0.001
Post-RadTFA	r=0.1; P=0.9	r=0.04; P=0.6	r=0.05; P=0.5
Pre-LDFA	r=0.3; P=0.001 (<0.05)	r=0.1; P=0.1	r=0.3; P<0.001
Post-LDFA	r=0.1; P=0.3	r=0.07; P=0.3	r=0.02; P=0.8

IMD=Intermalleolar distance, RadTFA=Radiological tibiofemoral angle, LDFA=Lateral distal-femoral angle, CLTFA=Clinical tibiofemoral angle

Table 5: Variables that affect the Bostman's knee score and parent's satisfaction

Variables	Knee score	Parents' satisfaction
Age	r=0.4; P=0.3	r=0.01; P=0.9
Height	r=−0.2; P=0.01 (<0.05)	r=0.1; P=0.1
Weight	r=−0.2; P=0.02 (<0.05)	r=0.2; P=0.01 (<0.05)
BMI	r=−0.1; P=0.3	r=0.2; P=0.1
Pre-IMD	r=0.2; P=0.2	r=−0.3; P=0.008 (<0.05)
Post-IMD	r=0.3; P=0.1	r=−0.3; P=0.003 (<0.05)
Pre-CLTFA	r=−0.04; P=0.6	r=0.1; P=0.8
Post-CLTFA	r=−0.2; P=0.01 (P<0.05)	r=0.1; P=0.6
Pre-RadTFA	r=−0.05; P=0.5	r=0.02; P=0.4
Post-RadTFA	r=−0.1; P=0.1	r=0.1; P=0.7
Pre-LDFA	r=−0.01; P=0.9	r=0.2; P=0.2
Post-LDFA	r=0.2; P=0.008 (<0.05)	r=0.01; P=0.1

IMD=Intermalleolar distance, RadTFA=Radiological tibiofemoral angle, LDFA=Lateral distal-femoral angle, CLTFA=Clinical tibiofemoral angle, BMI=Body mass index

Discussion

Apart from cosmetic issue, the untreated coronal plane malalignment of knee has increased risk of development of secondary changes such as early osteoarthritis and its rapid progression.[18] The change of biomechanics and consequent shifting of the knee loading more towards lateral compartment in valgus knee, causes anterior knee pain, patellofemoral instability, gait changes, and difficulty in running. Hence, severe GV deformity warrants surgical correction to restore knee mechanics and to prevent the offending knee from its effects.[4] Many corrective distal femoral osteotomy have been described for the deformity

Figure 5: Showing postoperative radiograph of an 18 years old patient, in which intraoperatively osteotomy site was found unstable after two K-wires. So, two more K-wires were inserted

Figure 6: Clinical photograph of a patient having infection at K-wire insertion site

probably because the most common site of deformity is distal femur.[16] Each individual procedure has its merits and demerits

A supracondylar linear distal femoral osteotomy is one procedure that involves the crushing of medial cortex and also requiring prolonged immobilization in a spica cast with a risk of subsequent knee stiffness.[5] The dome osteotomy is one of the widely used procedures; however, it has its limitations as it requires special instruments, periosteal stripping, leads to postoperative instability, requires an implant, and the excessive translation is required at the osteotomy site which limits the full correction of the deformity.[19] An intercondylar osteotomy, remained unpopular due to being an intraarticular osteotomy and, it requires prolonged period of nonweight bearing.[20] The most widely practiced osteotomy for correction of GV is supracondylar closing wedge osteotomy and fixation of osteotomy site by a rigid devices such as blade plate or screw plate. In spite of having satisfactory outcomes, the potential disadvantages such as large exposure, implant, and surgical cost, rigid plate fixation which does not permit subsequent adjustment of alignment postoperatively and requirement of second surgery for implant removal.[16] Another procedure is growth modulation technique for the deformity correction. This method is not useful after physeal fusion. In addition, its result is very unpredictable especially in post rachitic GV and hence it has remained an unreliable and technically demanding technique.[17,21]

Aglietti *et al*. used “V” osteotomy for the correction of valgus deformity, from mean TFA of 21°–2.3°, secondary to lateral compartment osteoarthritis of knee in the age group 52–77 years.[5] Further, its application has been extended to correction of GV deformity in adolescent to young adults by few clinician with uniformly satisfactory result.[16,17]

Gupta V *et al*. used “V” osteotomy at the level of adductor tubercle and fixed the osteotomy with a customized “L” buttress plate and assessed the clinical and radiological outcome.[16] Clinically, they assessed IMD, clinical TFA and Bostman score, and radiological TFA and LDFA. Their improvement was from 13.8 to 1.5 cm in IMD, 23.5°–6.1° in clinical TFA, 22.2°–5.1° in radiological TFA, and 79.2–89.1° in LDFA. Nearly 95.7% had excellent outcome on the basis of Bostman score. We also observed almost similar pattern of improvement as far as clinical and radiological outcome is concerned. Unlike them in our case second surgery was not required for implant removal. Further, average blood loss per procedure was 125 ml in their study which was approximately three times the loss in our study. Major advantage of our technique is flexibility of staged gradual correction which is required to prevent common peroneal nerve stretching, avoiding peroneal nerve decompression, and one more scar.

Agarwal *et al*. used K-wires from the medial side for the fixation of osteotomy site done for GV deformity secondary to rickets in age 10–12 years and achieved an excellent result in 88.9%.[17] We feel that K-wire insertion from one side may be sufficient in younger age; however, it is not sufficient enough to hold the fragment in place in young adults especially in age group more than 15 years and overweight patients. We considered crossed wire, a better mode of implant use for secure fixation of osteotomy. They also observed shorter period (6 weeks) than ours (average 15 weeks) required for the union of osteotomy site. This may be due difference in the patient’s age, which was more in our study.

There are few factors that are considered as the risk factors for GV. We found BMI as the factor which showed correlation with all parameters to measure GV. Similarly, study done by Bonet Serra *et al*.[22] had also observed a positive correlation between BMI and GV. We also determined the factors which affect the Bostman score after correction of GV. Among them, weight and height were identified as the factors not under control of surgeon, and affecting knee and parent's satisfaction score. However, poor results can be prevented by maximum possible correction. It was inferred that tall and overweight patients had poor Bostman score and parent's satisfaction.

Agarwal *et al*. observed a peculiar complication of slippage of distal femoral epiphysis probably because of excessive intraoperative force to crush distal metaphyseal cancellous bone.[17] However, in our study, all patients had either fused or about of fuse distal physis, and hence, this complication was not expected. Similar to them, we also observed infection as a complication controlled well on antibiotics. We encountered one patient who developed common peroneal neuropraxia had preoperative TFA 33° and corrected to 5°. Although, we encountered one such patient still we advise staged correction in case with TFA more than 25° to prevent nerve stretching. This freedom of gradual correction is not available in rigid implants, and additional common peroneal nerve decompression is required if full correction is done at a time. This will require another incision on the lateral aspect of the knee and proximal leg leading to another scar which might not be acceptable to most patients especially to the female.

In spite of having large number of sample size with reasonable good period of followup, there are few limitations of our study. The first being, it is a prospective study where comparison between the techniques or implants could not be addressed. However, the results obtained were comparable to other study done. A second potential limitation was the maximum period of followup was 36 months, and we cannot predict the effects of osteotomy and change in joint orientation on the joint's biomechanics in long run. And also, its effects on future knee replacement surgery if required. Finally, another weakness could be its dependence on the clinical and radiological measurements, whose reliability and reproducibility require attention. However, to eliminate this, the measurements were taken by three examiners who were blinded with respect to each other's measurements. The patients were reevaluated by our senior-most examiner in case of significant discrepancy.

Conclusion

Supracondylar "V" osteotomy and fixation with crossed K-wire and cylindrical casting is a simple, safe, low-cost procedure with a short learning curve for the correction of GV deformity in adolescent to young adults. Minimal implant and avoidance of second surgery for its removal make this procedure a worth adopting in a low-income countries. This procedure yields a uniformly good result; however, poor outcome score can be predicted in tall, overweight, and prevented by maximum possible correction. Hence, prognosis should be explained accordingly to every patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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