

# Long-term follow-up after percutaneous epiphysiodesis around the knee to reduce excessive predicted final height

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## Background

Excessive final height causes several negative orthopedic, psychosocial and practical side effects. **Percutaneous epiphysiodesis** is a safe and effective technique for reducing final height. [1, 2]

## Percutaneous epiphysiodesis

During a percutaneous epiphysiodesis, the epiphysis of the distal femur and proximal tibia are surgically damaged by means of a 6mm drill by an experienced pediatric orthopedic surgeon.

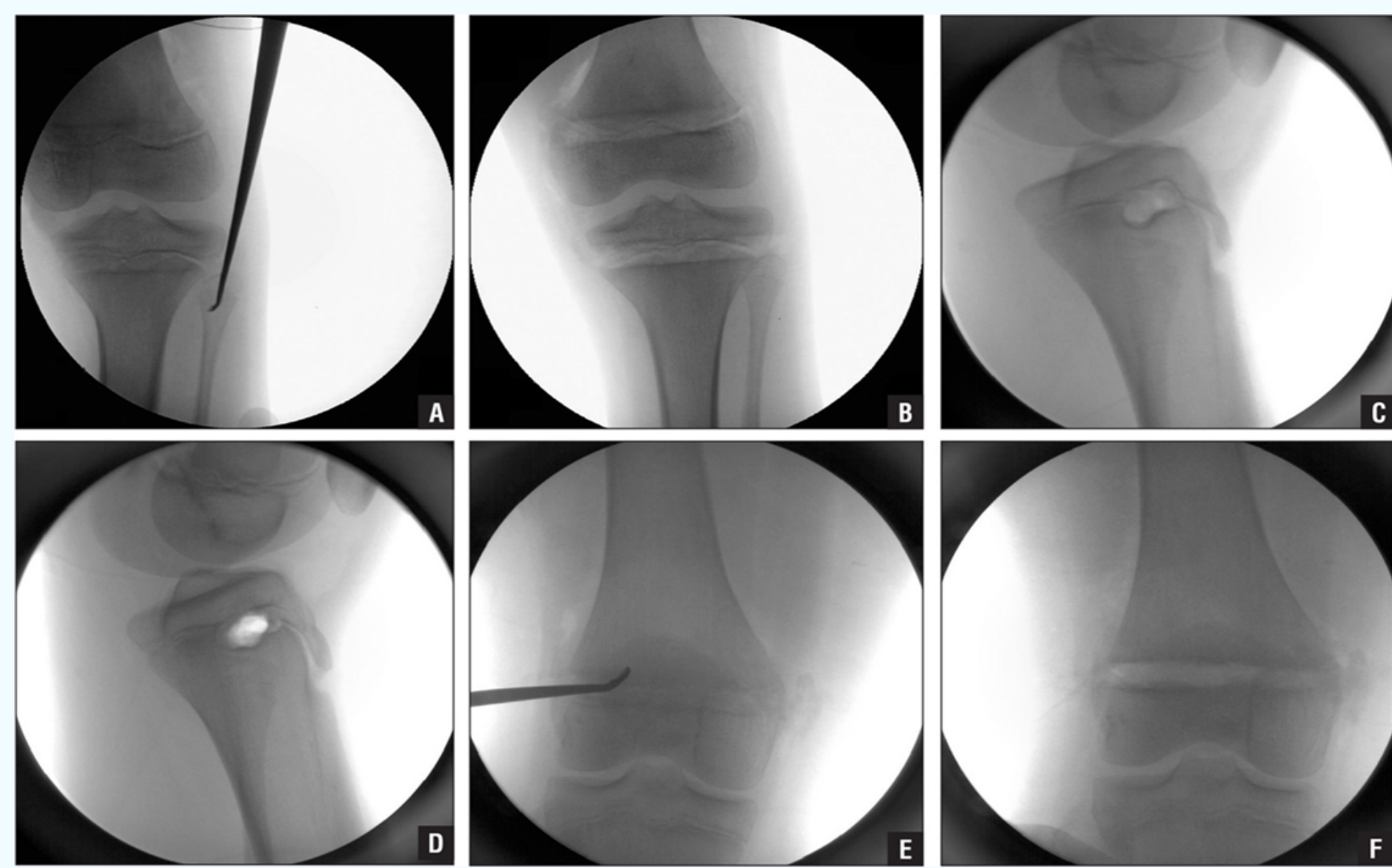


Figure 1. Radiograph pictures of the knee. In A and E the epiphysis is identified using a metal instrument. In B, C, D and F the epiphysis has been surgically removed.

## Research questions

- What are the **complications** linked to the percutaneous epiphysiodesis in adolescents with tall stature?
- Is **knee function** still intact after the surgery?
- Is there a high **patient satisfaction** with chosen treatment and final height? Would they recommend chosen treatment to close relatives and friends?

## Methods

### Retrospective cohort study

Inclusion criteria:

- Genetically tall boys and girls
- Consultation between 2000 and 2015
- Epiphysiodesis and control

Exclusion criteria:

- Hormone treated
- Syndromes and hormone deficiencies

Data collection

#### 1. Online questionnaire

Final Height (FH); Satisfaction; KOOS-Child questionnaire; Direct and long-term complications.

#### 2. File research

Bone age (BA); Chronological age at time of bone age (CA); Predicted final height using Bayley and Pinneau (PFH); Follow-up (FU)

## References

[1] Odink RJ, Gerver WJ, Heeg M, Rouwé CW, Bakker van Waarde WM, Sauer PJ. Reduction of excessive height in boys by bilateral percutaneous epiphysiodesis around the knee. *European Journal of Pediatrics*. 2006;165(1):50–54.

[2] Benyi E, Berner M, Bjernekuhl I, Boman A, Dionisio C, Nilsson O, Waehre A, Wehtje H, Sävendahl L. Efficacy and Safety of Percutaneous Epiphysiodesis Operation around the Knee to Reduce Adult Height in Extremely Tall Adolescent Girls and Boys. *International Journal of Pediatric Endocrinology*. 2010; 2010:740629

## Results

Table 1. Baseline characteristics in final height, chronological age (CA), bone age (BA) and predicted final height (PFH)

	Epiphysiodesis		Control	
	Male	Female	Male	Female
<b>N=</b>	34	27	19	25
<b>Height</b>	200.0 ± 4.7	185.3 ± 2.9	197.9 ± 4.4	184.4 ± 3.1
<b>CA</b>	14.2 ± 1.2	13.0 ± 1.3	14.1 ± 1.4	12.6 ± 1.1
<b>BA</b>	13.8 ± 0.6	12.5 ± 0.7	14.5 ± 0.9	12.9 ± 0.7
<b>PFH</b>	209.1 ± 6.3	190.6 ± 5.6	201.2 ± 5.0	185.3 ± 3.4
<b>FU</b>	6.3 ± 0.7	4.2 ± 0.5	7.9 ± 0.9	5.9 ± 0.6

### Knee function scores

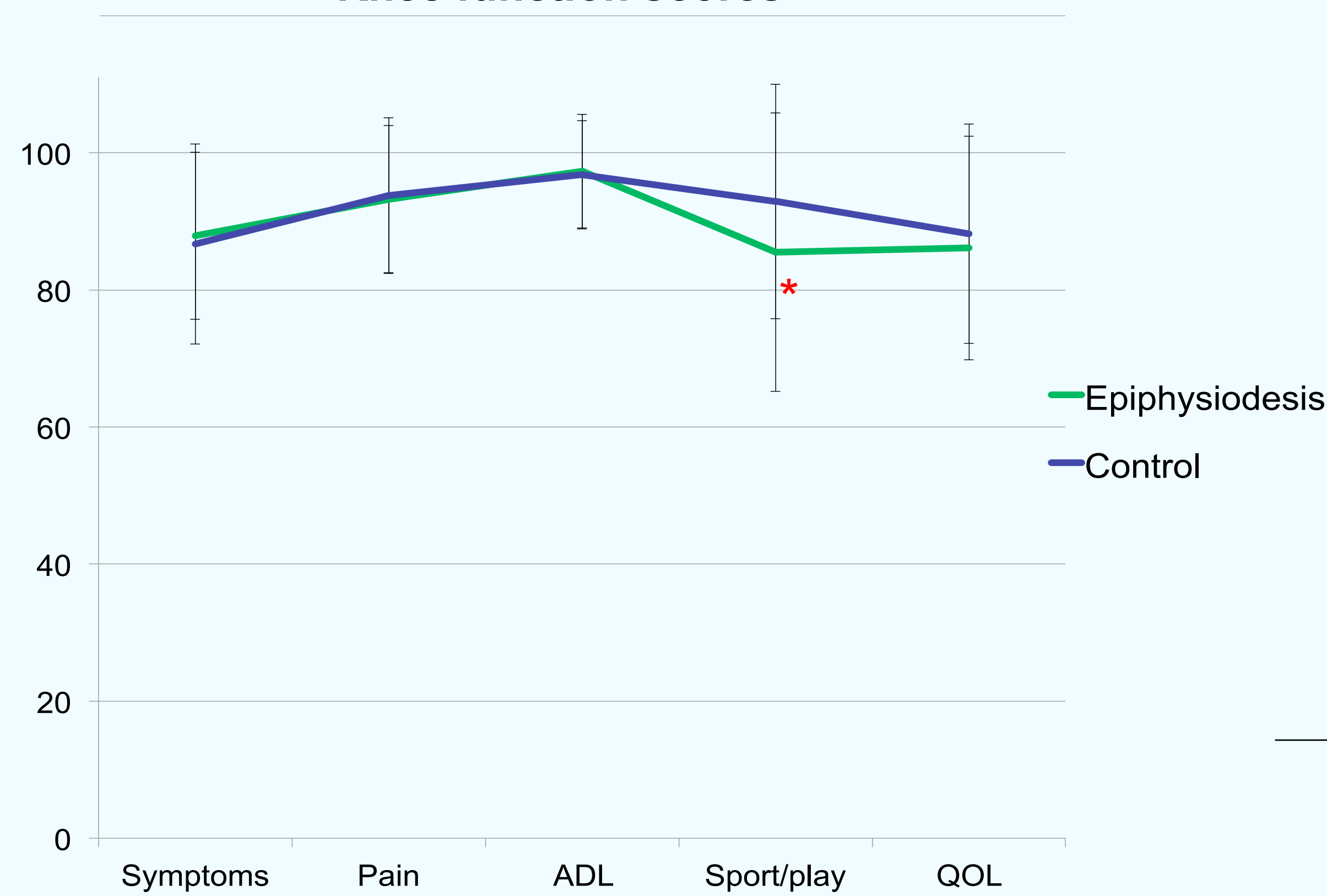


Figure 2. Results of the KOOS-Child questionnaire in symptoms, pain, activities of daily living (ADL), sport/play and quality of life (QOL). \* (p=0.04)

Table 2. Direct- and longterm complications after surgery

Direct complications	
Burn	4
Bleeding	1
Infection	1
Post operative pain	5
Temporary nerve damage	3
Temporary joint damage	1
Reoperation to remove excessive scar tissue	2
Long-term complications	
Lateralisation of fibula	1
Pain in prolonged standing	1
Painful scarring	2
Mild valgus or varus deformity	3

### Overall patient satisfaction

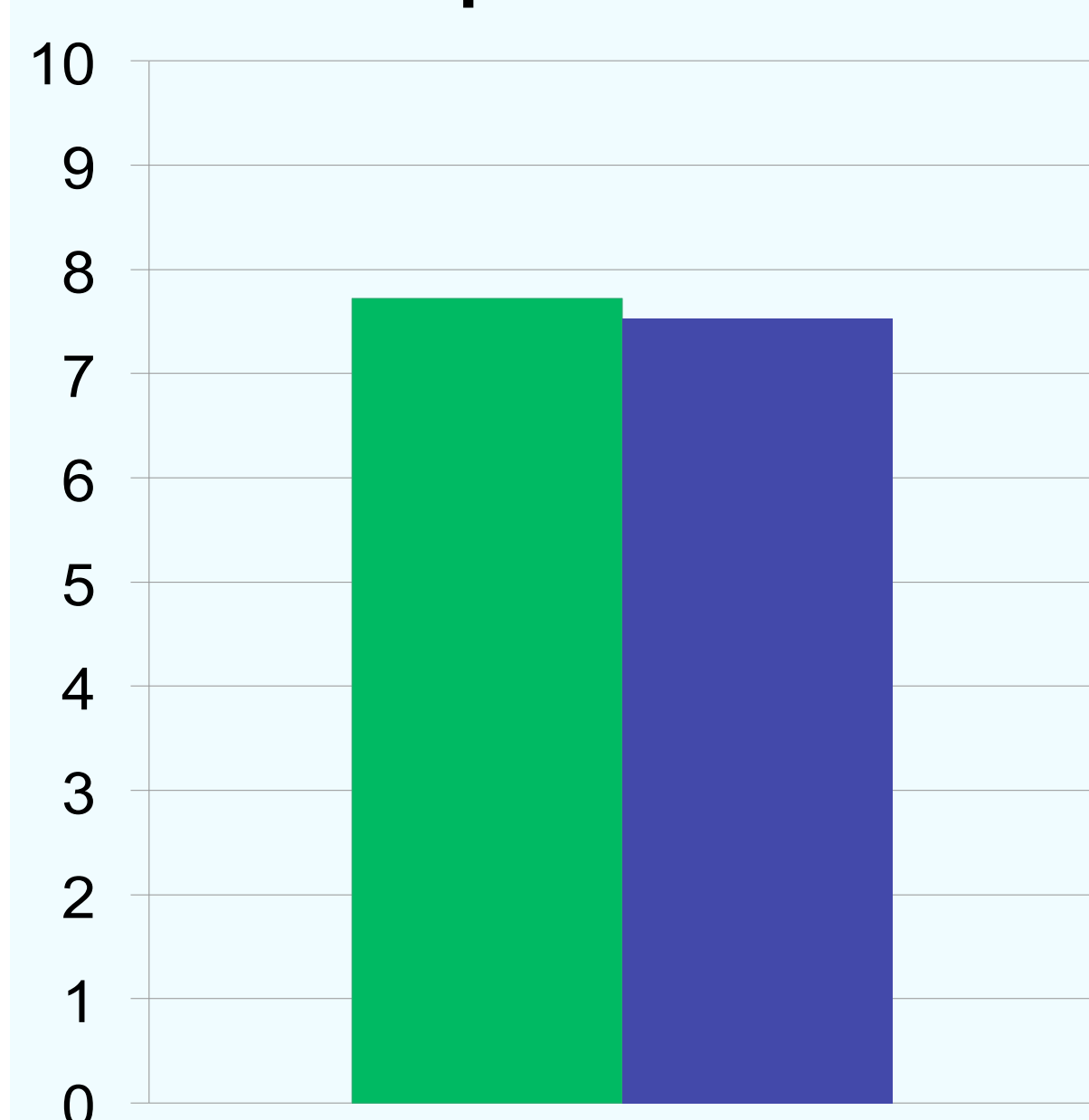


Figure 3. Overall satisfaction not significantly different

### Would you recommend the treatment you received to a close relative?

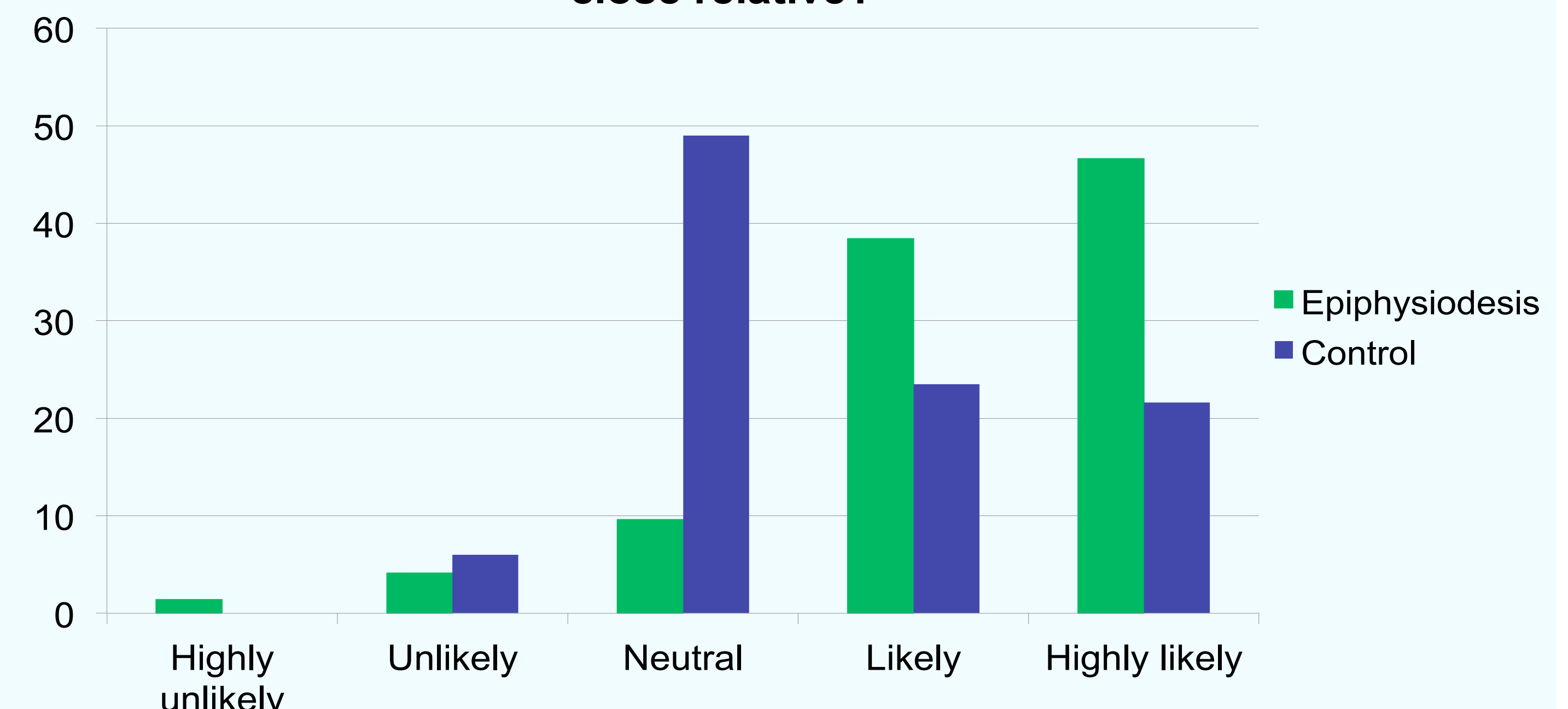


Figure 4. Distribution significantly different (p=0.001)

## Conclusion

Several (minor) **complications** were registered, in 2 cases a reoperation was needed. Long-term complications were seen in 7 cases (11%), they did not negatively influence knee function or satisfaction.

High scores, indicating **good knee function**, on the KOOS-CHILD questionnaire were given. On the subscale Sport/play the epiphysiodesis-group scored lower. Further research will need to specify the problems.

Overall **high satisfaction** rates were seen. The epiphysiodesis-group was more likely to recommend the chosen treatment to friends or family. These results show that also from the patients point of view percutaneous epiphysiodesis is an appropriate method to treat excessive final height.

Results on final height reduction will follow in the article containing data on the complete study population. These data were not yet available, as this study is still in progress