Gait function and EMG activity after total hip arthroplasty with the thrust plate prosthesis
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Introduction
The Thrust Plate Hip Prosthesis (TPP) is an implant with metaphyseal fixation to the proximal femur which leaves the diaphyseal bone untouched. Its basic feature is the direct load transfer to the medial cortical bone of the femoral neck. A major advantage of this design is the limited bone resection that is necessary for implantation (2). This makes it suitable for younger patients with coxarthrosis (1) who can be expected to require revision surgery in the long run.

Material & Methods
In our hospital, 37 thrust plate prostheses were implanted in 33 patients (20 female, 13 male) between 1995 and 1999. In a retrospective investigation 27 of these patients were available for follow-up at an average age of 47.8±11.3 years and an average follow-up of 2 years (range 3 months to 5 years). The clinical outcome was determined with the Harris Hip Score and radiographic analysis. Objective functional evaluation was based on 3-dimensional gait analysis and surface electromyography of the hip muscles.

Results
Subjective satisfaction was excellent in 6, good in 16, fair in 9 and poor in 2 patients (Fig. 1). An average Harris Hip Score of 85.2±18.3 (out of 100 max.) indicated a good functional restoration.
The range of passive hip motion was significantly reduced in the operated limb as compared to the contralateral side (flexion 110° vs. 117°, abduction 62° vs. 67°, internal rotation 48° vs. 64°).
The temporal-spatial gait parameters revealed a normal velocity and cadence (1.14 m/s, 110 steps/minute). Significant intra-individual differences were seen in the stance and swing duration of the operated versus the contralateral limb (p=0.003).
Kinematic parameters indicated a slight impairment of the operated limb. Hip and knee range of motion were reduced by 12% and 4%, respectively (p<0.0001, p=0.02, Figs. 2 & 3).

Fig. 1: Subjective satisfaction of the patients (n=33)

Fig. 2: Reduced hip extension in the operated leg compared to contralateral leg and control group.

Fig. 3: Reduced knee range of motion during the stance phase of the operated leg.
The kinetic parameters revealed a certain degree of unloading on the operated side. Vertical peak forces were significantly lower as compared to the contralateral side (4%BW, p=0.001, Fig. 4). Accordingly, the joint moments on the operated side were reduced in hip abduction (22%, p=0.001, Fig. 5), knee abduction (26%, p=0.001) and ankle extension (9%, p=0.001).

The EMG parameters indicated a significantly higher mean and peak amplitude of the tensor fasciae latae (mean 55%, p=0.015; peak 51%, p=0.013; Fig. 6) and gluteus medius (mean 34%, p=0.004; peak 21%, p=0.044; Fig. 7) and a lower peak activity of the gluteus maximus (19%, p=0.044).

**Discussion**

The results indicate a generally good functional outcome even though no symmetric loading could be observed. The affected limb revealed some degree of impairment without causing a major limitation in daily life activities. This may partly be due to the short follow-up of some of the patients.

**References**