OSSEOINTEGRATION OF THE UPPER LIMB – REHABILITATION AND OUTCOME.

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BACKGROUND
Osseointegration (OI) has been used for fixation of Upper Limb Prosthetics since 1990. The first application was at thumb level, in 1992 at transradial level and in 1994 at transhumeral level. There is a special team for Osseointegration on the upper limbs consisting of a co-ordinator, orthopaedic surgeons, prosthetists and an occupational therapist assessing all patients referred to the clinic.

The occupational therapist role is to assess the patient pre- and post operatively using a standardized questionnaire and DASH, to measure range of motion with and without prosthesis, pre/postoperative information with oedema prevention, range of motion training, loading exercises with training prosthesis, specific prosthetic training in activities of daily activities and regular follow-ups together with the team.

OI Protocol for Upper Limbs
A specific prosthetic rehabilitation procedure has been developed based on the protocol for OI of the lower limbs. After the first operation (S1) the patient performs gentle motion aiming for full range of motion after six weeks. Strengthening exercises of the upper body are started. When the oedema is reduced the previous prosthesis can be worn with some adjustments to the socket. The more specific part of the rehabilitation starts after Stage 2 surgery (S2). At transhumeral (TH) level, three to six weeks after surgery a short training prosthesis is used with application of weights and axial loading using a bathroom scale. At six weeks the aim is full range of motion. No short training prosthesis is used at transradial- (TR) and thumb (T) level. Instead the patient wears a cosmetic (TR/T) or a lightweight myoelectrically prepared (TR). Light bilateral activities can be started progressing to heavier loading depending on the bone quality and sensation of pain. After approximately 12 weeks the patient can be supplied with a myoelectric hand or multifunctional prosthesis (TR) and at TH level a full-length cosmetic prosthesis or lightweight myoelectrically prepared. Standardised prosthetic training follows.

METHOD AND MATERIAL
In February 2008 an anonymous questionnaire was sent to all documented users of osseointegrated prostheses of the upper limb, who had used their prostheses more than 1 year. It consisted of 8 open and closed questions comparing the situation before OI with conventional prostheses and after OI with osseointegrated prostheses.

RESULTS
Twenty-five individuals were included in the study out of thirty-four prosthetic applications. Nine patients were excluded. Four patients were non-prosthetic users at the time, one patient was lost to the investigation and four patients had used the OI prosthesis less than one year. One bilateral patient on TR level is presented as two cases.

Totally there were 11 patients at TH level, 9 at TR level and 5 thumb amputations. Four were female and 21 male with age ranging from 24 to 77 years.

Compared situation pre/post OI (No=25)
Prosthetic use

0
5
10
15
20
Daily, > 8h
Daily, < 8h
A few
days/week
Once a
week
Once a
month
Once a
year
No use
Number
Pre OI
Post OI

Figure 1: Prosthetic use before and after OI

Compared situation pre and post osseointegration.

Figure 2: Prosthetic sensation, ROM, don/doff
**DISCUSSION**

The patients state that prosthetic use has improved compared with the situation before osseointegration. They experience better sensation with the bone anchored prosthesis than with socket prosthesis. Range-of-motion has improved and it is much easier to don/doff the OI prosthesis. Overall function with the prosthesis has increased and quality of life has improved.

None of the thumb amputees were prosthetic users before osseointegration. After OI their activity level were improved and the new prosthetic thumb could be used in ADL-activities such as “writing”, “eating”, “handling money”, “horse-riding”, ”doing handicrafts” etc. At TR level some of the patients comments are “increased comfort”, “no sore stump” and “better prosthetic sensation”. “Improved range of motion” and “the prosthesis feels more secure - does not come off” are some statements at TH level.

Osseointegration on upper limbs has increased the patients’ repertoire in daily life.

**REFERENCES**

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