

## Department of Plastic and Reconstructive Surgery

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### General Summary

Research in the Department of Plastic and Reconstructive Surgery is focused on 4 basic areas: 1) the causes and treatment of craniofacial anomalies, 2) the causes and treatment of hand and foot anomalies, 3) the mechanism of wound healing and the grafting of skin and bone, and 4) microsurgical transplantation. The faculty of our department consists of surgeons representing virtually all areas of plastic surgery and clinicians from related disciplines. This diversity provides the stimulating atmosphere necessary for productive research. The participation of plastic surgery residents and postresidency fellows in research studies provides them with important experience and expands their understanding of anatomical and physiological factors involved in these special areas of surgery.

### Research Activities

#### *Treatment of complications after free flap reconstruction for head and neck cancer*

Of the 328 patients who underwent free flap reconstruction after excision of head and neck cancers from January 2005 through January 2010, 14 patients had total flap necrosis. The necrotic flaps were 7 free jejunum flaps, 3 rectus abdominis musculocutaneous flaps, 2 anterolateral thigh flaps, and 2 fibular bone flaps. As soon as the necrosis of free jejunum flaps was recognized, salvage procedures were performed. Free flap reconstruction was performed in 6 patients, and the grafts survived in 5 patients. Considering functional and cosmetic aspects, free flap retransplantation is desirable as a salvage strategy for total flap necrosis. When free flap reconstruction is difficult, a pedicled flap is an option, if some degree of function and cosmetic effects can be maintained.

#### *Evaluation of flap vascularization with intraoperative and postoperative infrared thermal imaging*

Success rates of free flap reconstruction of large defects due to excision of malignant tumors are high (at least 95%). Wound dehiscence and other complications, however, are occasionally seen, especially in patients who have received radiation or chemotherapy or both. Infrared thermography (TVS-200EX, NEC Avio Infrared Technologies, Ltd., Tokyo) is a reliable, noninvasive technique for assessing the vascularization and viability of free flaps and surrounding tissue. It is a useful method for monitoring free flaps and provides valuable information for avoiding complications.

#### *Ilizarov Minifixator*

The Ilizarov minifixator is a useful device in various areas of hand surgery. Its clinical

usefulness was demonstrated in the treatment of fractures (open fracture, comminuted fracture, fracture adjacent to the joint), joint contractures, malunion of fractures, and pathological fractures caused by enchondroma. It was also used with good results in bone lengthening and the temporary traction of joints. Use of the Ilizarov minifixator is an effective and noninvasive method and is highly recommended in selected cases.

#### *Distraction osteogenesis*

The use of distraction osteogenesis in reconstructive surgery continues to expand and evolve. The effects of the various rates and frequencies of distraction have been studied, and a rate of 1 to 2 mm per day has been found to be adequate for the craniofacial skeleton, whereas a rate of 0.5 to 1 mm per day is suitable in the extremities. Distraction osteogenesis is especially useful in the treatment of hemifacial microsomia, brachydactyly, and differences in limb length.

#### *Use of flaps in reconstruction of the hand*

Flap surgery is frequently needed in reconstruction of an injured hand. Suitable flaps are selected according to the sites of skin and soft-tissue loss. Also required are the diagnosis and treatment of accompanying injuries of nerves, vessels, tendons, bones, and joints. Primary treatment is often the most important for the functional outcome of the hand.

Frequently used flaps are oblique triangular flaps for tip injuries, digitolateral flaps for the palmar side of the digits, and adipofascial turnover flaps and free anterolateral thigh flaps in reconstruction of the gliding floor of the extensor tendons.

#### *Congenital anomalies associated with isolated cleft palate*

A total of 183 cases of isolated cleft palate (59 in boys and 124 in girls) from 1968 through 2003 were evaluated. The average age of the patients at the first examination was 9.9 months (range, 4 days to 11 years). Congenital anomalies other than cleft palate were observed in 57 patients (31.1%; 21 boys and 36 girls). Cleft type 43 (13 boys and 30 girls) occurred in both the hard and soft palates, and cleft type 18 (8 boys and 10 girls) occurred in the soft palate only. No congenital anomalies were found in the cases of submucous cleft palate. Tongue tie was found in 7 cases, inguinal hernia in 5 cases, congenital heart diseases in 8 cases, anomalies of the extremities in 12 cases, and mental retardation in 11 cases. Pierre Robin sequence and Apert syndrome were each found in 11 cases.

#### *Dye laser therapy for infantile hemangioma (strawberry mark)*

Early dye laser treatment for strawberry marks has been performed with good results. Patients are classified by the age of first treatment into 3 groups (younger than 1 year, 1 to 2 years old, and older than 2 years) and by appearances into 2 groups (plaque type and tumor type). The results of laser treatment in each group were investigated. In all patients surface wrinkles disappeared. In patients younger than 1 year tumor-type marks tended to flatten. Our patients showed less conspicuous scar formation than did patients not receiving dye laser treatment. Strawberry marks are common

in premature infants, 7 of whom were treated. Flattening was observed in tumor-type marks, and good results were obtained in the majority of cases.

### Publications

**Matsuura S, Soga M, Hayashi J, Miyawaki T, Uchida M.** Treatment for joint contracture of the fingers using Ilizarov mini fixators (in Japanese). *Nihon Sogai Kotei Kotsuendo Gakkai Zasshi*. 2013; **24**: 67-71.

**Ninomiya K, Park S, Miyake K, Hatano T, Uchida M, Nojima K.** Anatomical details and operative procedure for ingrown toe nail (in Japanese). *Sosho*. 2012; **3**: 154-9.

### Reviews and Books

**Uchida M.** Polysyndactyly of the 5th toe (in Japanese). *Keiseigeka*. 2012; **55**: 637-43.

**Hayashi J.** Clinical application of MDCT for treatment of lower extremity varix (in Japanese). *PEPARS*. 2013; **73**: 73-8.

**Hayashi J, Uchida M.** Treatment of lower extremity varix under local anesthesia (in Japanese). *PEPARS*. 2012; **72**: 72-6.