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

Introducing the techniques of aesthetic surgery in open septorhinoplasty

Rhinoplasty plays a great role in the treatment of nasal obstruction, as the anterior nasal airway is responsible for 70% of airway resistance. Although caudal septal deviation is known to cause nasal obstruction, it has been untreated in the past in Japan as the caudal septum is a key structure to be preserved in conventional intranasal septoplasty. Damage to the caudal septum may compromise the shape of the nasal pyramid. Recently we have been collaborating with otorhinolaryngological surgeons in functional rhinoplasty and have introduced open septorhinoplasty techniques that are widely used in aesthetic surgery. The open approach allows correction of the deviated L-strut under direct vision and is best indicated in the treatment of caudal septal deviation and internal/external nasal valve obstruction.

Treatment of nasal valve obstruction

The nasal valve region plays a key role in nasal breathing. Although a variety of techniques have been described to treat nasal valve compromise in the international literature, they are rarely used in Japan. Both nostrils collapsed completely under forced inspiration due to the weak cartilagenous support. There was no nasal deformity other than narrowing of both nostrils. Preoperative computed tomography revealed that the nasal septum was straight and the inferior turbinate was not swollen. Anterior nasomanometry showed that nasal resistance in the sitting position was increased preoperatively. Open septorhinoplasty was performed, and a 10-mm-wide L strut was left intact. The internal nasal valve was widened with a pair of spreader grafts. The external nasal valve was reinforced with the techniques of a columella strut and an alar batten graft. The spreader graft was given

the role of septal extension graft to support the tip of the nose. Postoperative nasal resistance was less than the standard for adults, and the nostrils never collapsed under forced inspiration. Nasal valve compromise can cause nasal obstruction, even when the septum is straight, but can easily be treated with techniques well known in aesthetic surgery.

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 for selected cases.

A long-term follow-up study of Apert hand

The treatment of hand deformity in Apert syndrome is challenging. Digital separation is usually completed before 2 years of age to ensure proper growth and functional development; however, few studies have investigated the long-term results of digital separation. We described long-term results of digital separation performed in our department to show how Apert hand is improved functionally by surgical treatment. Forty-two patients were treated from 1974 through 2013; 5 of these patients were followed up for more than 10 years after complete digital separation. Evaluation included the range of motion in the hands, radiographic examination, and the Disabilities of the Arm, Shoulder, and Hand Questionnaire score. According to Upton classification, the hand deformity was type 1 in 1 patient and was type 2 in the other patients. Three of the 5 patients who were followed up long term underwent mental development testing, which showed IQs of 57, 70, and 92. Most interphalangeal joints were stiff, and the total active motion of the fingers ranged from 0 to 65 degrees. Radiographs showed fused interphalangeal joints. The Disabilities of the Arm, Shoulder, and Hand Questionnaire scores ranged from 4 to 32, with good scores for the 2 patients with IQs greater than 60. Some of the patients can write with a pen, eat with chopsticks, and type on a keyboard. None of the patients were able to pinch between thumb and fingers; however, some of the patients pinched between index and middle fingers or the middle and ring fingers to pick up small objects. None of the patients were employed. Digital separation of Apert hand contributes to functional and aesthetic improvement, but further evaluation is needed to understand the long-term affects of Apert hand on patients, especially those of normal intellectual ability.

Free skin flap reconstruction after partial hypopharyngectomy with laryngeal preservation

Surgical resection of hypopharyngeal cancer often affects laryngeal functions. The aim of our study was to retrospectively assess the reliability and efficacy of free skin flap transfer after partial hypopharyngectomy with laryngeal preservation. The subjects were 54 patients who underwent free skin flap reconstruction immediately after partial pharyngolaryngectomy or hypopharyngectomy with laryngeal preservation. The defects were classified into 4 types on the basis of the area of the hypopharyngeal defect. Functional results

were evaluated by means of routine physical examination, variables related to swallowing, and X-ray barium deglutition examination. Perioperative mortality and morbidity were reviewed. There were no perioperative deaths, and 98% of the flaps survived. Forty-three patients (80%) were able to eat an unrestricted diet and experienced no aspiration. Restriction of the diet was significantly correlated with the extent of esophageal mucosal resection. Free skin flap reconstruction is confirmed to be a safe and effective strategy for maintaining laryngeal function and good quality of life.

Assessment of surgical complications with the Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity in head and neck reconstruction

The usefulness of the Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity (POSSUM) for evaluating the risk of reconstructive surgery after resection of head and neck cancers was examined. A total of 188 patients who underwent head and neck reconstruction after cancer extirpation from January 2010 through December 2011 were studied. The predicted risk of complications was calculated with the POSSUM and compared with the actual rate of perioperative complications. Perioperative complications occurred in 35 patients (19%) and consisted of systemic complications in 17 patients (9%) and surgical site infection in 20 patients (11%). The patients were divided into a perioperative complication group and a noncomplication group. A significant difference between the groups was observed in terms of predicted postoperative rate calculated from the POSSUM ($p = 0.01$). The POSSUM is a useful indicator of the risk of reconstructive surgery after the resection of head and neck cancers. The cutoff value of the POSSUM calculated from the receiver operating characteristic curve using Youden's index was 45.9%. Therefore, patients might be considered to be at high risk of perioperative complications when the POSSUM is 45.9% or greater.

Publications

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