Indian Journal of
Plastic Surgery

IJPS 2001; 34: 111-118

International Abstracts

Repair of nasal columella defect with long slender tubed flap

You WT, Niu XT, Kong FK. Chin J Repart Reconstr Surg 2000; 14: 290-292 (In Chinese)

The objective is to introduce the clinical application of a long slender tubed flap constructed with "bridge" technique in the repair of nasal columella defect.

From 1968 to 1998, 18 cases with complicated nasal columella defects were repaired with long, slender tubed flaps. Among the 18-tubed flaps, 13 cases were designed on the medial side of the upper arm and 5 cases on the longer cervical region paralleling the clavicle. The tubed flaps were 2.0 to 2.5 cm wide and 11 to 15 cm long. The length of the segment of each "bridge" was 3 to 7 cm.

No flap necrosis or other complications occurred. Postoperative follow-up was 3 to 60 months. The reconstructed columella showed satisfactory contour, good texture and color, and satisfactory resistance to injury.

By using the "bridge" technique the tubed flap can be made long and slender enough to provide relatively abundant tissue with adequate circulation and delicate contour. Combined with strict case selection, long slender tubed flaps can bring excellent functional and cosmetic outcome in the repair of nasal columella defects including those with partial defect of the nasal tip, ala, septum, or defect of adjacent soft tissue.

However, this method is relatively time-consuming.

Khoo Boo Chai

Corresponding Author: Kong Fan-hu, Depart of Plastic Surgery, 3rd Hosp., Beijing Medical University, Beijing 100083, P R China.

Application of silk as scaffolds for three-demensional culture of chondrocytes

Wu HT, Zhong CP, Gu YD. Chin J Reparat Reconstr Surg 2000; 14:301- 304 (In Chinese)

The objective is to observe the effects of silk on the attachment, shape and function of the chondrocytes culture in vitro.

The silk from silkworm cocoons were digested by trypsin and coated with polylactic acid to from three-dimensional scaffolds for rabbit chondroyte culture. The growth and shape of the chondrocytes were observed with phase contrast microscopy, and scanning electrum microscopy. The chondrocytes adhered to silk slowly after chondrocytes were seeded onto the silk scaffolds and the cells fixed onto the silk well 1 or 2 days later. The cells began to proliferate after 3 days and multiplicative growth was observed on the 6th day. Micro holes of silk scaffolds were filled with chondrocytes 2 weeks later. Scanning electron microscopy showed that there was a lot of extra cellular matrix surrounding the cells.

Silk is ideal for attachment, growth and function maintenance of chondrocytes and silk can be used as scaffolds for chondrocytes in three-dimensional culture.

Khoo Boo Chai

Corresponding Author: Wu Hai-tao, ENT Hosp, Shanghi Medical University, Shanghai 200031, PR China.

Prevention of postoperative deep venous thrombois in lower limb after operation by intermittent pneumatic compression

Lu WJ, Yu NS, Lin ZX. Chin J Reparat Reconstr Surg 2000; 14: 129- 131 (In Chinese)

The aim is to investigate the effect of intermittent pneumatic compression on the prevention of deep venous thrombosis after operation of lower limbs. From 1997 to 1998, forty cases received total hip arthroplasties, 4 cases received total knee arthroplasties and 12 cases received dynamic hip screw.

Postoperatively, every case continuously received intermittent pneumatic compression for 14 days, and venography was performed on the operated lower limb on the 7th day after operation to chick the presence of deep venous thrombosis.

Among the 40 cases, there were 4 cases of deep venous thrombosis without symptoms of pulmonary embolism, the incidence rate was10%. The writers conclude intermittent pneumatic compression can significantly reduce the incidence of deep venous thrombosis after the operation of the lower limbs.

Khoo Boo Chai

Corresponding Author: Dr Lu Wei-Jie, Department of Orthopedic Surgery, First Affil Hospital, Guangzhou Medical College, Guangzhou 510120, P R China.

Experimental study on the extent of injured blood vessels in an avulsion amputation model

Shang J, Zhang XY, Bi ZG. Chin J. Repart and Reconstr Surg 2000; 14:135- 138. (In Chinese)

The objective is to measure the length and extent of the injured blood vessels in an avulsion amputation model. Twenty rabbit were randomly divided into 2 groups, Group A was a sharp amputation group, and group B was an avulsion amputation group. The length and extent of the injured blood vessels was observed with naked eye, operative microscope and electron microscope, and the limb were replanted. Group A and B were explored at three days and ten days after the replantation respectively. The patency rate and healing process were compared. All the severed ends of vessels in group A were neat with almost the same injured range in the three layers of the vessels wall about 1mm away from the severed end. The vessels of group B were damaged seriously and the endothelial cells were destroyed. The "jumping-like" damage could be observed in the elastic fibers. The injury of 2 to 3mm away from the normal vessel wall could be observed by operation microscope. The damage of avulsion amputation vessels was irregular, 2to 3mm or more tissues should be excised under the microscope in the process of operation in order to ensure the presence of healthy intact blood vessel walls.

Khoo Boo Chai

Corresponding Author: Dr Shang Jian, Department of Orthopedic Surgery, First Affil Hosp, Harbin Medical University, Harbin Heilongjiang 150001, P R China.

Experiment study of mechanism and measure of prevention and treatment of hypothermal vasoconstriction

Gu YD, Wang T, Shen YW. Chin J Reparat Reconstr Surg 2000; 14:139-141. (In Chinese)

The objective is to investigate the mechanism and to explore measures of prevention and treatment of hypothermal vasoconstriction using the techniques of endothelial cell culture and scanning electron microscopy, and vasomotor functional test of isolated vascular vessels, the relation of hypothermal vasodilative factor were observed.

Hypothermia obviously induced vasoconstriction of isolated vascular vessels, whether endothelium was intact or removed, the lower temperature, the higher the vascular tension. Removal of endothelium could decrease the effect of vasoconstriction by hypothermia. The conditioned medium of bovine aortic endothelial cell could induce significantly vasoconstriction of isolated rat common neck arterial ring in hypothermia. It indicated that the bovine aortic endothelial cell secreted contractile factors into the medium. Reheating to 37°C or vasodilator or reheating plus vasodilator did not obviously influence the hypo-

thermia-induced vasoconstriction within 2 hours. When reheating to 50°C, vascular tension was decreased, but only changed in range of 28% to 42%. Hypothermia vasconstriction is relative to vasoconstriction factors secreted by the endothelium. Reheating to 37°C or vasodilator does not antagonize the constriction of blood vessels. Reheating to 50°C partially eliminates the constrict effect of blood vessels, so the prevention of hypothermia the constrict effect of blood vessels, so the prevention of hypothermia vasoconstriction should be emphasizes.

Khoo Boo Chai

Corresponding Author: Dr Gu Yu-dong, Department of Hand Surgery, Huashan Hosp, Shanghai Medical University, Shanghai 200040, P R China.

Clinical study on changes of fibroblast growth factor in burn wound

Niu XT, Guo H, Gu TM. Chin J Reparat Reconstr Surg 2000; 14:261-263. (In Chinese)

The writers investigate the changes of fibroblast growth factor (FGF) in burn wounds. The FGF expression in the center of wound granulation, the edge of wound, the healed part of wound, the normal skin of patients, and the heal course of third degree burn wounds were detected by immunohistochemical methods. The expression intensity of FGF was different in the different sites of third degree burn wounds, The Highest contents of FGF was in the center granulation of burn wounds, less was in the borderline of wound and healed skin, and the least was in the healed skin. FGF expression mainly concentrated in the middle layer of wound, and almost no FGF expression was found in normal skin. The most FGF expression occurred at 14 days after injury in second degree of burn wound.

The changes of FGF in wounds are closely related to the wound healing, and rational use of FGF can promote wound healing.

Khoo Boo Chai

Corresponding Author: Niu Xing-Tao, Department of Burns and Plastic Surgery, Bethume int'l peace Hosp, Shijiaxhuang, Hebei 050082, P R China.

The applied anatomy of transposition of the distal dorsal ulna flap pedicled with dorsal metacarpal artery

Liu HS, Chen ZG, Yu GR. Chin J Reparat Reconstr Surg 2000; 14:295- 297. (In Chinese)

The objective is to investigate the anatomic basis for transposition of the distal dorsal ulna bone flap pedicled with dorsal metacarpal artery to repair the defect of the 3rd or 4th and 5th metacarpal bone head. in 30 adult cadaveric upper limbs, the branches and constitution of the dorsal carpal arterial networks were observed.

The dorsal carpal arterial network consisted of the dorsal branches of ulnar and radial arteries, the terminal branches of the posterior interosseous artery and the dorsal carpal branch of the anterior interosseous artery. The 2nd, 3rd, 4th dorsal metacarpal branches originated from the network. The dorsal metacarpal branches were anastomosed with the deep branches of deep palmar arch to constitute the dorsal metacarpal artery.

Transposition of the distal dorsal ulna bone flap pedicled with 3rd, 4th dorsal metacarpal arteries can be used in repairing the defect of 3rd, 4th and 5th metacarpal bone heads.

Khoo Boo Chai

Corresponding Author: Lui Hui Song, Department of Microsurgery, 2nd Affil Hosp, Hubei Medical University, Wuhan, Hubai 430071, P R China.

Treatment of nonunion of the scaphoid bone by transfer of radial periosteal bone flap pedicled with recurrent radial artery

Yen I, Zhong GW, Ren ZX. Chin J Reparat Reconstr Surg 2000; 14: 293-294. (In Chinese)

This paper introduces the operation method of treatment of nonunion of the scaphoid bone by

transfer of pedicled radial periosteal bone flap. From 1986, 26 cases with old nonunion of scaphoid bone were treated by transfer of radial periosteal bone flap pedicled with recurrent branch of radial artery, the size of the bone flap was 1.0cm x 0.4cm x 0.5cm.

All patients with old nonunion of scaphoid bone healed by first intention, bone union occurred after 2 to 3 months of operation, and the wrist joint almost recovered its normal function.

The writers conclude that it is an effective operation method to treat nonunion of the scaphoid bone.

Khoo Boo Chai

Corresponding Author: Yan Yi, Deptment of Orthopedic Surgery, 451 Hosp of PLA, Xi'an, Shanxi 710054, P R China.

Skin resurfacing with ultrapulse co_2 laser

Liu Cl, Yuan KH, Zeng HL. Prac Aesthetic Plast Surg 2000;11:19-21. (In Chinese)

The aim is to observe the results of skin resurfacing with ultrapulse $C0_2$ laser, and to note its complications. Eighty-two cases of skin resurfacing were done in the area of the lower eyelid, temporal, forehead and cheek. Good results were obtained. The main drawback is development of post operation pigmentation (15.9%) three months after the skin resurfacing, especially in dark skin people. This gradually fades away in about half a year. Some remedy could be used to prevent the pigmentation i.e. hydroquinolone applied 1 month before and up till 3 months after the operation. Not one case of long-term pigmentation has occurred to this day. Good results of skin resurfacing can be obtained with ultrapulse c02 laser, and it is superior to the other usual methods. The problem of pigmentation is an important consideration and must be emphasized to the patient.

Khoo Boo Chai

Corresponding Author: Liu Chun Li, Plastic Surgery Center, Liu Husqiao Hosp, Guangzhou 510010, P R China.

Experimental students of distraction osteogenesis of mandible in rabbits

Wei M, Mu XZ, Zhang DS. Prac Aesth Plast Surg 2000; 11:10-13. (In Chinese)

The writers established the animal model of distraction osteogenesis of the mandible in rabbits and explored the mechanism of craniofacial bone lengthening. The right mandible of rabbit was osteotomized completely and positioned with a distractor for one week, then distracted 0.9. mm every day for 10 days. The bones were harvested at intervals of 1 day and 2,4 and 8 weeks after completing the distraction, and studied by histology and the electron microscope. They found that there were a lot of fibrocytes and fibroblasts at the gaps in the early stage as well as numerous collagen bundles. Later, the trabeculae formed and the osteoblasts appeared on its surface. The Fibroblasts and osteoblasts in active function and secreted a large amount of collagen around them. Two week after distraction completion, the gap was occupied with woven bone and Haversian systems were formed. Meanwhile, no cartilage was found at the gap during the distraction. The fibroblasts and osteoblasts secreted a large amount of collagen in the gap, and then it developed trabeculae by calcification. The writers are of opinion that the new bone was formed by intramembranous ossification.

Khoo Boo Chai

Corresponding Author: Wei Min, Department of Plastic and Reconstructive Surgery, Ninth People's Hosp Shanghai 200011, P R China.

Longitudinal biomechanical effect on repair option of artery injury

Jie Q, HuangYT, Zhao L. Chin J Reparat Reconstr Surg 2000; 14: 132- 134. (In Chinese)

The objective is to investigate the relationship between the different length of vessels and the options of vascular repair, and to compare the different options of repair because of the longitudinal biomechanical effect. A clinical analysis was undertaken to evaluate the major arterial and

venous injuries in human extremities repaired by end-to end anastomosis of venous autograft (177-cases.185 vessels). Compared the defect length of the same kind of vessels repaired by different options (student- t test). Evaluated the defect length to repair arterial injuries by end- to- end anastomosis and by vein graft (by means of 95% confidence interval). The writers found there was significant difference between the defect length of brachial artery repaired by end-to-end anastomosis and femoral artery and popliteal artery repaired by autogenous vein graft ($p<0.01$). The upper limit of confidence interval in the defect length of brachial artery, femoral artery and popliteal artery was 3. 17 cm, 2.81 cm and 2.44 cm respectively by end-to- end anastomosis by means of 95% confidence interval. The lower limit of confidence interval in the defect length of brachial artery, femoral artery and popliteal artery was 2.82cm and 2.17cmrespectively by vein by means of 85% confidence interval. The defect length of brachial artery, femoral artery and popliteal artery repaired by vein graft was linear correlation with the length of graft.

Because of the longitudinal biomechanical difference of arteries and veins in human extremities, different options of repair are necessary to different arterial injuries.

Khoo Boo Chai

Corresponding Author: Dr Jie Qiang, Instit Orthop Surg, Xijing Hosp., Xi'an, Shanxi, P. R. China 710032.

Breast Augmentation: Choosing the optimal incision, Implant and pocket plane.

David A. Hidalgo. Plast Reconstr Surg 2000; 105: 2202 -2216.

The design of breast augmentation procedure is almost entirely determined by three variables: the selection of incision location, the pocket plane for implant placement and the appropriate implant. Implant related variable include size, shape, shell texture, filler substance, and final implant fill volume in the case of saline implants. This study is a retrospective review that seeks to establish the optimal indications for each of three variable options as they relate to specific types of augmentation problems.

In this study a retrospective analysis of 220 patients was performed to review surgical design in Breast augmentation. Three specific issues were studied: incision site, implant variables and pocket plane selection. The influence of these factors on aesthetic results in both primary and secondary cases was the focus of the analysis.

In 77 primary augmentation patients and 80 unilateral augmentations for symmetry in breast reconstructions, were the following untoward results. 11 revisions for unilateral mal-position, change to different size and shape, four deflation of saline implants requiring replacements, and four conversions of saline to silicone gel implants. In 63 secondary cases, there were two hematomas, and two infections requiring implant removal and subsequent replacement.

The most common options selected for primary augmentation in this study included trans-axillary approach, sub muscular pocket plane and smooth saline implants.

The most common options selected for secondary augmentation included periareolar incision, no change in pocket plane and placement of textured silicone gel implants.

A standardized approach to breast augmentation may be suitable for most patients. However, optimal results will be consistently achieved if flexibility is retained in surgical design and if the combination of incision, pocket plane, and implant is customized when one is presented with specific anatomic variants and secondary problems.

Bhaskara KG

Corresponding Author: David A. Hidalgo. 655 park Avenue, New York, N Y 10021. Email: dahidalgo @aol.com

Analogs of Fronto-orbital advancement for Apert, Crouzen, Pfeiffer and Saethre-Chotzen Syndromes.

Granger B, Wong, Evan G. Kakulis, John B. Mulliken, Plast Reconstr Surg 2000; 105: 2314-2323.

Brachycephaly is the defining dysmorphic feature of the well known eponymous coronal synostotic syndromes. Decreased anteroposterior cranial dimension is the result of abnormal development (synostosis) of the coronal sutural ring, since 1980, fronto-orbital advancement in infancy has been the conventional surgical strategy.

The purposes of this study were (1) to document outcome after primary fronto-orbital advancement for the four major eponymous craniosynostotic syndromes (Apert, Crouzon, pfeiffer and Saethre -chotzen) and (2) to identify factors that might influence the need for primary and secondary fronto-orbital advancement. Also tested was the hypothesis, "concomitant sagittal synostosis (scaphocephaly) could counteract brachycephaly", resulting in a more normal cranial shape (balanced dysmorphism) and it's effect in the need for primary or secondary fronto-orbital advancements.

Data was collected on age and indications for initial operation, type of primary and secondary frontal procedures and concomitant sagittal synostosis. Patients treated by monobloc advancement or Le Fort III osteotomies with frontal grafting were assessed as having had primary fronto-orbital advancement. Minimum time for follow-up was 5 years. A total of 126 patients met inclusion interia. Lateral photographs were examined to assess preoperative and postoperative sagittal position of supra orbital rims-to-globes.

Of these infants who had a primary fronto-orbital advancement, re-operation for either supra-orbital retrusion or frontal deformity was necessary in all 16 apert patients, and in 5 of 19 crouzon (26%), 10 of 26 pfeiffer (38%) and 13 of 20 saethre-chotzen (65%) patients. Age at initial fronto-orbital advancement did not influence reoperative rate. No correlation was found between concomitant sagittal synostosis and necessity for primary or secondary frontal correction.

Apart patients had the highest incidence of reoperation for frontal retrusion or forehead contour.

Bhaskara KG

Corresponding Author: John B Mullikan, Chidren's Hospital, Division of Plastic Surgery, 300 Long Wood Avenue, Boston, Mass, D2115. Email - mullikan@a.l.tch.harvard.edu.

Long term viability of cryopreserved cultured epithelial grafts

Udoh Y, Yanaga H, Tai Y, Kiyokarva K, Inoue Y. Burns 2000; 26: 535-542.

Cultured epithelial grafts are effectively used for treating skin defects, such as extensive burns. In the present study, cultured epithelial grafts were prepared by the feeder layer method developed by Rhainwald and Green and cryopreserved using 10% Glycerine as cryoprotective agent by a simple method in which grafts were placed in a polystyrene box in a deep freezer. To assess the viability of these stored grafts, their cell survival rate and their colony forming efficiency of cryopreserved at -135° and at -80° were followed over time.

Flow cytometery showed that the cell survival rate of the grafts cryopreserved at –135°C for 1 month, 6 months, and 1 year averaged 89.3%, 61.7% and 61.6% respectively. Cryopreservation at –80°C cell survival rate for one month was 93.4%, but after six months it was reduced to '35.2%. In histological examination, the cell structure and basal layer were very well preserved after 6 months of storage at –135°C, but not at –80°C.

Cell survival rate at –135°C was also assessed by colony-forming efficiency. Colony-forming efficiency of the grafts cryopreserved for 1 month, 6 months and 1 year averaged 66.1%, 58.5% and 55.1% of control (noncryopreserved) grafts.

These findings suggest that, even cultured epithelial grafts are subjected to long ûterm cryopreservation, cell viability remains sufficient, reculturing is possible, and the graft banking could for clinical applications. Further study of

use of other cryoprotectants (other than 10% Glycerin, which was used in present study) is expected to improve the cell survival rate in the future.

Pramod Kumar

Corresponding Author: Hiroko Yanaga, Department of Plastic and Reconstructive Surgery, Kurume University school of Medicine, 67 Asahi-Machi, Kurume city, 830-0011, Japan.

The use of sub atmospheric pressure dressing therapy to close lymphocutaneous fistulas of the groin.

Greeze SE, Adelman M; Kasabian A, Galiano RD, Scott R, Longakar MT. Br J Plast Surg 2000; 53: 404-487.

The incidence of lymphorrhoea after groin incisions ranges from 1.2% to 5.1%. Treatment options are somewhat controversial and range from conservative compression dressings to surgical ligation of the leaking lymph channel. In this report, the authors describe a new, less invasive, approach using sub-atmospheric pressure dressing (SPD) therapy for treatment of lympho-cutaneous fistulas of the groin in two cases. The SPD was polyvinyl foam applied directly over the wound. The foam is sealed air tight by clear polymethane adhesive drape dressing. A tube embedded in the foam exits to a suction machine that provides a subatmospheric microenvironment over the wound. The mechanical forces of SPD stimulate the formation of granulation tissue. It is thought that when SPD is applied to lymphocutaneous fistulas, the leaking lymphatics are scaled by the surrounding rapid proliferation of granulation tissue. The SPD therapy is less invasive and provides the added benefit of promoting granulation in the surrounding wound. In poor surgical candidate, SPD therapy seems to be a better option. However, if successful, surgical ligation is a faster option than SPD. This report appears to be the first description of treating groin lymphocutaneous fistula with SPD therapy.

Pramod Kumar

Corresponding Author: Steven Greer, 300 East 34th street, 9th floor, New York, NY 10016, USA

The Value of the history in the diagnosis of Capal Tunnel Syndrome

Bland JDP J Hand Surg 2000; 25B: 444-450

Nerve conduction studies are widely regarded as the best available, though imperfect, diagnostic test for carpal tunnel syndrome with a sensitivity and specificity probably in excess of 90%. This study attempts, firstly, to measure the usefulness of a small selection of clinical features from the history in predicting the findings on nerve conduction studies in a large population of patients suspected of having carpal tunnel syndrone, and secondly to develop a simple tool for qualifying the clinical history.

The study population included all patients (7,768 patients) with suspected carpal tunnel syndrone referred for nerve conduction studies and probably the great majority of patients presenting with carpal tunnel syndrone in East Kent over an eight - years period (December 1991 to August 1999). Some of the patients attended more than one occasions.

The clinical history from all patients were elicited by a short symptom questionnaire and compared with neurophysiological findigs. Distribution of the symptoms to the radial part of the hand and nocturnal exacerbation of symptons showed the strongest individual correlations with positive nerve conduction studies. During nerve conduction studies, all patients had conventional measures of median and ulnar orthodomic sensory conduction from finger to wrist and measures of motor terminal latency to abductor policis brevis recorded on both hands, supplemented by either a sensory potential recorded at wrist on ring finger stimulation, or segmental studies of finger / palm and palm / wrist conduction if uncertainity remained after the routine tests.

The regression model derived from the complete questionnaire achieved an overall sensitivity of

79% and specificity of 55% for the diagnosis of carpal tunnel syndrome when compared with the nerve conduction study results as a gold standard. A simple regression model for evaluating the history compares favorably the widely used clinical signs in its ability to predict the findings of nerve conduction studies.

Corresponding Author: Dr Jeremy Bland, EEG Department, Kent and Canterbury Hospital, Ethelbert Road, Cantelbury, Kent CT1 3NG, UK.

Experimental: Looking beyond near future

Prefabricated vascularized bone flap: A tissue transformation technique for bone reconstruction

Alam MI, Asahina I, Seto I, Oda M, Enomoto S. Plast Reconstr Surg 2001; 108: 952-958

The present study is an attempt to develop a prefabricated vascularized bone flap from a muscle flap in the exact desired configuration by utilizing bone morphogenic protein 2 (rh BMP-2; an osteoinduc-tive protein) in a silicon mold. Bone morphogenic protein 2 inhibits the myogenic differentiation of C2C12 myoblasts and converts their differentiation pathway into that of osteoblastic lineage.

The experiment was carried on eighteen Wistar rats separated into control (six rats) and experimental (12 rats) group. First of all silicon molds were prepared using mandibles of rats from both control and experimental group. Rat bone matrix powder impregnated with (experimental group) or without (control group) rhBMP-2 was spread in the moulds. These moulds were used to enclose the muscle flap on their vascular pedicle (saphenous vessels) from rat thigh. The host vessels were observed to pass through the opening between two halves of each mold. These molds enclosing muscle flap with intact vascular pedicles were anchored to the adjacent muscles and skin was closed over the implant. Animals of both groups were killed at either 2 or 4 weeks after surgery and flaps were subjected to radiological and histological examination. None of the three control muscle flaps induced bone formation, whereas all of six experimental flaps induced bone formation (evidenced by radiopaque shadow on radiological examination of the experimental flap and new bone formation along with marrow tissue enveloping a central area that obtained muscle tissue interspersed with vascularized tissue on histological examination; osteoblasts were observed to line the bony trabeculae in the newly formed bone).

To summarize, the present study demonstrated a highly effective method of bone reconstruction: creating a vascularized bone flap of desired shape and size by applying an osteoinductive factor to a molded muscle flap attached to host vessels.

Pramod Kumar

Corresponding Author: Izumi Asahina, DDS, PhD. Oral Surgery, Department of Oral Restitution, Division of Oral Health Science, Tokyo Medical and Dental University Graduate School, 1-5-45 Yushima, Bunkyo-ku, Tokyo 113-8549, Japan. Email: asahina.osur @tmd.ac.jp