ABSTRACTS

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New Method of Venous Interposition Grafts, Using Fibrin Glue. Kenji Sugiura, Yukio Nakatsuchi, Ryo Yagi, Yoshihiro Sugimoto, *Department of Orthopaedic Surgery, Shinshu University School of Medicine and Division of Orthopaedic Surgery, Shinmachi Hospital, Nagano, Japan*

We designed a new technique of venous interposition grafts, using fibrin glue produced by Human Immuno Co., and then investigated the patency rate of this method and examined the results histopathologically. In 30 rats, weighing 150 to 200 gm, the vein graft taken from the external jugular vein was implanted into the severed common carotid artery of about 1 mm in diameter in the following manner. Modified sleeve anastomosis was done at the proximal site and end-to-end anastomosis with four stitches at the distal site. Fibrin glue was then put on these two sites of anastomoses.

RESULTS

The patency rate was 97% in more than 1 week after the operation. Histological examination revealed that fibrin glue was absorbed within 2 weeks postoperatively, and also that the lumen of proximal anastomosis was covered with neointima. The narrowing of the vascular lumen at the proximal site was improved in 3 weeks. But at the distal end-to-end suture site, degenerative findings were seen even after 3 weeks postoperatively. From the above histological findings, the reduction of stitches is thought to be of great importance in the healing process of vascular anastomosis.

We used the method of this vein graft in one clinical case, completely amputated at the PIP joint level of the middle finger, and the patient regained a good revascularization.

Experimental Study on the Microarterial Graft to Artery. H. Takai, Y. Murata, S. Miyoshi, I. Tsuruga, T. Igata, M. Fujiuchi, *Miyoshi Prefectual Hospital Tokushima, Japan*

The authors reported postoperative changes of the autogenous epigastric vein graft to the femoral artery of the Wistar rat at the ninth annual meeting of the Japanese Society of Reconstructive Microsurgery. In the report, it was shown that muscle coat in the vein graft was replaced by a thick layer of collagenous fibers, although endothelial cells were regenerated.

To compare with this result, study on the autogenous femoral artery graft of the Wistar rat was performed. A five to ten-millimeter segment of femoral artery was excised and replaced in the same position. Then the graft was reexcised with recipient artery at varying postoperative periods, and a histological examination was performed.

In the artery graft, endotheial cells and muscle coat of the media were reserved almost intact. The anastomotic site was endothelialized by 1 week.

From these findings, it is evident that artery graft is more stable and preferable than vein graft for arterial substitute.

Full-Thickness Skin Autograft With Venous Drainage: An Experimental Study. Akihiro Fukui, Susumu Tamai, Akihiro Okuda, Kenji Masuhara, Yoshitka Tatsumi, *Department of Orthopedic Surgery, Nara Medical University (A.F., S.T., A.O., K.M.) and Department of Orthopedic Surgery, Nara Prefectural Hospital, Nara, Japan (Y.T.)*

Ninety-two male Fischer rats, 350–400 gm in weight, were used for this experiment. A 4 × 3 cm and a 4 × 6 cm full-thickness skin graft including the panniculus carnosus were raised on the dorsum of each animal, and the iliolumbar veins were used as the draining veins. Then the survival rate of these grafts was compared.

Control groups: Full-thickness skin grafts, 4 × 3 cm (12 rats), 4 × 6 cm (12 rats) in size were raised. At this time the bilateral iliolumbar neurovascular bundles were ligated and cut.

Venous preserving groups: Full-thickness skin grafts, 4 × 3 cm (15 rats), 4 × 6 cm (53 rats) in size, were raised. At this time, except for the bilateral iliolumbar veins, which were to be used as draining veins, the iliolumbar arteries, nerves, and other neurovascular bundles were cut after ligation.

RESULTS

Many grafts showed complete necrosis in control groups. On the other hand, venous preserving groups survived completely, except for a few cases. But superficial necrosis was seen in all cases 10 days after operation. For this reason, plasma that was obtained by "plasmatic circulation" passes out through the draining veins.

An Experimental Study on the Effect of Fluorocarbon on the Preservation of an Amputated Rabbit Ear As a Model of Human Digits. Takashi Sakuma, Masamichi Usui, Toshihiko Ogino, Akio Minami, *Department of Orthopedic Surgery, Hokkaido University School of Medicine, Sapporo, Japan*

Hypothermic storage of amputated parts is essential to achieve successful replantation. Our previous studies using amputated legs of dogs suggested that perfusion of the amputated leg by fluorocar-

bon (FC), which has a capability of oxygen transportation to tissue, is effective in the prevention of the anaebolic glycolysis during the period of ischemia and in prolongation of the period of ischemia.

To investigate the effect of FC on the prolongation of amputated digit, 20 rabbit ears were completely amputated and stored in 4°C by the following different methods. Each five ears were immersed in oxygenated FC (Group A), in oxygenated Hartmann fluid (Group B), in nonoxygenated Hartmann fluid (Group C) for 48 hours, and in oxygenated FC for 72 hours (Group D). After the ischemia insult, each ear was replanted microsurgically.

Survival rates were 80% in Group A, 60% in Group B, 0% in Group C, and 20% in Group D.

In histological observation, the vessel walls of ears in Group C were damaged and intima cells were detached.

These results suggest that FC is effective in the prolongation of the ischemia period of the amputated ear, and seems to be clinically relevant to preservation of amputated digits in replantation surgery.

Bioassay of Choline Acetyltransferase Activity for the Sensory and Motor Nerve Identification: An Experimental Study. Tetsuo Kamikubo, Shigeru Mizumoto, Hajime Ohgushi, Akihiro Fukui, Hiroshi Sakamoto, Susumu Tamai, Kenji Masuhara, *Department of Orthopedic Surgery, Nara Medical College, Kashihara, Nara Japan*

To identify the sensory and motor funiculi of a peripheral nerve, Engel and his associates (1980) first reported a bioassay technique based on the enzymatic activity of choline acetyltransferase (CAT). He proved that the activity of CAT in the motor nerve funiculus is significantly higher than that in the sensory nerve funiculus.

So as to investigate the serial changes of CAT activities in the proximal and the distal cut ends of the completely transected sciatic nerve, an experimental study was done using 75 male Fischer 344 rats. The animals were divided into 12 groups dependent on the serial time intervals after the transection of the nerves, and a 1-mm segment was obtained from each cut end for the bioassay of CAT activity. The CAT activities in both ends were elevated 30 minutes after the transection and then, in the proximal end, the activity gradually decreased until 12 hours after, and increased again until the third week. In the distal end, however, it gradually decreased until the third week. To identify 10 to 20 funiculi, it takes only 40 to 60 minutes, with relative ease and accuracy during an operation of nerve repair.

Vascularized Nerve Graft Based on the Arterio-Venous Shunt: Experimental Investigation in Rats: A Preliminary Report. Yoshio Nakayama, *Department of Plastic and Reconstructive Surgery, Institute of Clinical Medicine, The University of Tsukuba, Ibaraki, Japan*

The vascularized nerve graft reported by I. Taylor possesses some advantages. But scarcity of donor nerve is its main disadvantage. So the possibility of the nerve graft based on the arterio-venous shunt was investigated in rats.

In one groin, nerves and arterio-venous shunt were covered with skin graft. In the other side, nerves were covered with skin graft, and this constituted the control. After 2 weeks, vascularity of the nerves was examined using fluorescein dye injection, Indian ink injection, and hematoxylin eosin staining. The control nerves vanished thoroughly, but the nerves adjacent to the arterio-venous shunt preserved their structure.

The vascularized nerve graft based on the arterio-venous shunt is quite within the bounds of possibility.

Experimental Study on Vascularized Nerve Grafts: Periodic Change in Protein Composition of Peripheral Nerves After Nerve Graft. Isao Koshima, Kiyonori Harii, *Department of Plastic Surgery, Institute of Clinical Medicine, University of Tsukuba, Ibaragi Pref. (I.K.) and Department of Plastic Surgery, Faculty of Medicine, University of Tokyo, Tokyo (K.H.), Japan*

In this report, protein composition of peripheral nerves was studied in vascularized nerve grafts using SDS-PAGE analysis.

MATERIALS AND METHODS:

A total of 59 Wistar strain rats' sciatic nerves were used as vascularized nerve grafts (31 samples) and as free nerve grafts (28 samples). A nerve graft, 15 mm long, of each group was made in the sciatic nerve and embedded in a silicone tube after transplantation. After the operation, the sciatic nerves were periodically taken from the sacrificed rats, and cut into small segments to homogenize with sample buffer. The SDS polyacrylamide gel system was used to analyse the soluble proteins of each sciatic nerve segment.

RESULTS

There was an accumulation of 200,000 molecular weight (M.W.) protein, originated neurofilament, at grafted segments in both types of graft after the fourth postoperative week. A new formation of 70,000 M.W. protein was seen at all the segments in both types of graft immediately after the operation. Compared to each type of graft, the accumulation of 200,000 M.W. protein at grafted segments was much greater in vascularized nerve grafts than in free nerve grafts. Re-appearance of 32,000 M.W. protein, originated from myelin, was evident at seventh post-operative week in vascularized nerve grafts and not until the 12th week in free nerve grafts. These results suggest that cytoskeletons of regenerated axons in vascularized nerve grafts would be periodically developed earlier than in free nerve grafts. The 70,000 M.W. protein, newly formed in both types of graft immediately after operation, was unknown for its original cytoskeletons in this study.

The Surgical Management of the Brachial Plexus Injuries. Sang Soo Kim, *Orthopaedic Department, Chonnam University Hospital, Kwang-ju, Korea*

Since 1980, the author has treated brachial plexus injuries by microsurgical means. Among them, clinical observation was done in 15 patients who were followed for more than 1 year after operation. The postganglionic lesions were operated by autologous interfascicular nerve graft and neurolysis. In the preganglionic lesions, intercostal nerves were transferred to the musculocutaneous nerve. The results were analyzed into individual muscle groups.

The deltoid muscles were completely paralyzed in 12 cases preoperatively, but after operation only four remained entirely paralyzed. The elbow flexors, which was the most frequently involved group of muscles by injuries, had zero mobility in 13

cases preoperatively. But through surgery, nine cases showed recovery that was fair or good. The triceps brachii also showed good response to surgery; six patients recovered from total paralysis. However, the muscle groups below the elbow, such as wrist flexors, wrist extensors, finger flexors, and finger extensors, showed no significant response to surgery. Only two or three patients recovered. But fortunately, by preoperative evaluation, it was found out that these below-elbow muscle groups were less frequently involved by injuries than above-elbow muscle groups. These results would appear better if they included data from a follow-up up to 3 years after the operation. Anyway it can be concluded that autologous interfascicular nerve graft is one of the best ways to rectify brachial plexus injury, especially postganglionic lesion.

Anatomical Evaluation for the Cutaneous Branch of the Peroneal Artery and Vein. M Beppu, K Murota, K Ohkubo, Y Tomita, Tsu Min Tsai, *Department of Orthopaedic Surgery, Jikei University School of Medicine, Tokyo, Japan (M.B., K.M., K.O., Y.T.,) and University of Louisville, Kentucky (T.M.T.)*

By recently recognising the possibility of the free vascularized fibula graft with skin, it has been proven possible not only to check the viability of the graft but also to reconstruct a skin defect and bone defect simultaneously. But anatomical evaluation for the number of the pedicles from the peroneal artery and the skin territory of this flap has not been done adequately. We therefore undertook a study of its anatomic feasibility in fifteen cadaver legs. A large flap around the leg was elevated and left attached only along the posterior crural septum to preserve the cutaneous branches of the peroneal artery and vein. This was done to prevent extraneous sources of vasculature from reaching the skin flap. The peroneal artery was canulated and the flap was sutured back in place. The artery was injected with a colored radiopaque silicone latex (microfill).

As a result, four to five pedicles branched from the peroneal artery and vein to the skin through the posterior crural septum. The skin territory averaged 22 × 10 cm at the posterolateral part of the leg.

The Free Vascularized Sural Nerve Graft. Kazuteru Doi, Kanjiro Omote, Koichi Tamaru, *Department of Orthopedic Surgery, Yamaguchi University School of Medicine, Yamaguchi, Japan.*

The sural nerve is described as a new donor nerve of the free vascularized nerve graft in three clinical cases. The vascularized sural nerve is nourished via the fascial vascular plexus, which grow out of the perforating branches of the peroneal vessels. Compared to the radial nerve, the sural nerve has many advantages; 1. sensory loss at the donor site is negligible; 2."double barreled" nerve graft can be designed without damage to its mesoneurium or vessels; 3. survival of the nerve graft can be reasoned by the accompanying flap; 4. skin defect at the recipient site can be closed by accompanying flap without additional vascular anastomoses.

The final extent of sensory recovery in our cases could require several more months, but a quickly advanced Tinel's sign suggested its superiority.

Free Vascularized Sural Nerve Graft. Mitsuo Yoshimura, Takao Shimada, Shinichi Imura, *Department of Orthopedic Surgery, Fukui Medical School, Fukui, Japan*

For the reconstruction of important damaged nerves with large gaps in the extremities, free nerve grafts have generally been performed. While Taylor has advocated free vascularized nerve grafts, the method is however, limited in terms of both donor nerves than can be used and suitable cases. Therefore its application has been restricted to special cases.

We found that sural nerves, often used for conventional free nerve grafts, could be applied to the free vascularized sural nerve graft. This method consists of detaching the sural nerve along with subcutaneous fatty tissue and the cutaneous branch of the peroneal artery in the surrounding tissue, followed by anastomosing this cutaneous branch or the peroneal artery and vein. This surgical technique is introduced here, giving the cases on which it has been performed.

We found that reinnervation using this method took place faster than the conventional free nerve graft. This method, in which the graft is performed with much subcutaneous fatty tissue around the sural nerve, seems to be particularly suitable for cases in which poor bed conditions exist, such as those for serious scar.

Closure of Oral and Pharyngeal Defects With Free Forearm Flap. Tsuyoshi Takato, Isamu Ono, Satoshi Ebihara, *Division of Head and Neck Surgery, National Cancer Center, Kiyonori Harii, Department of Plastic Surgery, Faculty of Medicine, University of Tokyo, Japan*

Following introduction of Yang, Chen, and Gao, the forearm flap based on radial vessels and cephalic vein has been widely accepted for a versatile free flap donor site. Since December, 1982, we have effected the microvascular free transfer of this flap for reconstruction of oral and pharyngeal regions after ablation of cancers in 17 patients. Based on our clinical experiences, the following advantages of this flap are recognized: 1) Vascular anatomy of forearm flap is usually constant and easily accessible. 2) The forearm flap is therefore elevated safely and quickly. 3) It is relatively thin and has less hair. 4) Large flap can be harvested with reliable vascular supply. 5) A long vessel pedicle containing large vessels can be raised and this greatly simplifies the technical aspects of free tissue transfer. 6) It can be used as an osseous-compound flap with radius.

One-Stage Repair of Pharyngo-Esophageal Defects With Microvascular Surgery. Hidemaru Takeda, Kiyonori Harii, Akira Sasaki, Isamu Ono, Satoshi Ebihara, Hiroo Saito, Atsushi Yamada, Hiroshi Tanaka, *Department of Plastic Surgery, University of Tokyo (H.T., K.H, A.S.), Division of Head and Neck Surgery, National Cancer Center Hospital, Tokyo (I.O., S.E., H.S), Plastic Surgery Unit, Shizuoka General Hospital, Shizuoka (A.Y.), and Department of Plastic Surgery, Shizuoka Children's Hospital (H.T.), Shizuoka, Japan*

Free jejunal transfer with microvascular anastomosis is one of the available procedures for repair of pharyngo-esophageal defects. However, patients who were operated on with jejunal transfer often complain of various discomforts such as difficulty of swallowing,

regurgitation to the nasal cavity, vague discomfort around neck region, and so forth. Surgical stress is substantial for debilitated patients since it is necessary to open the abdomen for this procedure.

In order to overcome such drawbacks, we devised a new technique. This method involves one-stage transfer of cutaneous roll made from radial forearm flap with microvascular asastomosis. We reported on the comparative study based on 24 cases (free jejunal transfer, 17 cases; free forearm flap seven cases) with presentation of some illustrative cases. The conclusions are as follows: 1) Long segment of jejunum can be used for filling up a large defect brought about on ablative surgery. The maximum length of forearm flap used was 14 cm and the average was 12.3 cm. 2) Various incipetence on deglutition were observed in cases of jejunal transfer. They may be chiefly due to peristaltic movement. On the other hand, swallowed bolus passes fast through the region reconstructed with the forearm flap when there is no stricture of anastomosed site. 3) Patency rate of microvascular anastomosis were 100%. All transplanted tissues survived in either method.

Small Intestine: A Versatile Donor Material for Reconstruction of Cervical Esophagus and Oral Cavity. Takao Harashina, Toyomi Fujino, Jun Gotoh, Haruo Sakamoto, Ryuzaburo Tanino, Masaki Nishimura, Mitsuhiro Osada, *Department of Plastic and Reconstructive Surgery, Keio University School of Medicine (T.H., T.F.) and Departments of Oral Surgery (J.G., H.S.) and Plastic and Reconstructive Surgery (R.T., M.N., M.O.), Tokai University School of Medicine, Japan*

Six cases of reconstruction of cervical esophagus, four primary and two secondary reconstructions, and nine cases of reconstruction of oral cavity by microsurgical transfer of small intestine were performed. In reconstruction of oral cavity small intestines were used as patch graft by opening their lumens longitudinally.

With the advent of modern microsurgical techniques the procedures have become quite safe and reliable and we have found that small intestine is a very useful reconstructive material for these purposes.

A Clinical Study of Free Intestine Transfer for the Pharyngoesophageal Reconstructions. M Nozaki, R Kimura, K Sasaki, S Wakamatsu, T Hirayama, M Endo, *Department of Plastic Surgery, (M.N., R.K., K.S., S.W., T.H.) and The Institute of Gastroenterology (M.E.) Tokyo Women's Medical College, Japan*

Reconstruction of pharyngoesophagus following disruption from cancer surgery is one of the most difficult problems. Replacement of intestine to the defect cervical digestive tract is considered to be the most ideal one. Radiological, fibroendoscopical, and histological observations of the reconstructed pharyngoesophagus were discussed on the 20 successful cases of free intestine transplantation with microvascular techniques for these reconstructions.

X-ray findings of barium swallow showed free passage and active peristalsis, which disappeared within 4 months following the transplantations. Endoscopical observations showed no significant difference from a nongrafted pharyngoesophagus. Histological examinations of the grafts showed preservation of the myenteric nerve plexus and no evidence of metaplasia of the mucosa.

Recent progress in microvascular surgery makes this procedure extremely reliable, without difficulty.

Autotransplantation of the Adrenal Gland With Microvascular Anastomosis: Application to Hormonal Therapy of Breast Cancer. Masao Matsuda, *Department of Surgery, Chukyo Hospital, Nagoya, Japan*

Bilateral adrenalectomy and oophorectomy have played an important role in the hormonal treatment of metastatic or advanced carcinoma of the breast. However, after this procedure, permanent replacement therapy of corticoids is necessary. If the autotransplantation of the adrenal gland into the portal circulation is performed successfully, it is anticipated that estrogen will be inactivated in passage through the liver, while corticoids will pass through the liver relatively unchanged, thus obviating replacement therapy.

On March 17, 1983, an autotransplantation of the left adrenal gland into the mesenterium combined with a bilateral oophorectomy and right adrenalectomy was performed in a 48-year-old female who suffered from compressed fracture of the first lumbal vertebra due to metastatic carcinoma of the breast. Her left adrenal gland was transferred into the mesenterium with microvascular anastomosis between the subphrenic artery and jejunal artery, and the adrenal vein and jejunal vein. Patency of the anastomosed artery was confirmed by postoperative angiography, and preoperative severe lumbago had disappeared. Urinary output of estrogen decreased remarkably; however, at present, 6 months after operation, adrenal function is not yet recovered sufficiently and a small dose of hydrocortisone (5–10 mg/day) is demanded.

Microsurgical Vasovasostomy. M. Murakami, H. Ito, K. Kawamura, J. Shimazaki, *Department of Urology, School of Medicine Chiba University, Chiba, Japan*

Seven patients, 4 months to 19 years postvasectomy underwent microsurgical vasovasostomy. Vas anastomosis was accomplished with a single transmural layer of 9-0 nylon. All patients have sperma counts 3 or more months postoperatively. After 1 year of pregnancy rate of 100% was achieved.

Long-Term Results of Free Vascularized Toe Joint Transfers in Reconstruction of the Finger Joints. Fujio Kawakami, Kazuteru Doi, Kazuhiro Sakai, Hiroyasu Ichimoto, Shinya Kawai, *Department of Orthopedic Surgery, Yamaguchi University School of Medicine, Yamaguchi, Japan*

Five free vascularized autogenous transfers of the second toe joints were applied to reconstruction of four traumatized joints and one congenital defect of CM joint of the thumb.

Three PIP joints involved in two patients have some extension lag, ranging -14 to $-50°$ at the following study of 8 to 17 months. We considered the extension lag of the transplanted PIP joints to be due to factors such as repair of lateral band, influence of the volar plate of the recipient digits, the method of bony fixation, and less ROM of the toe PIP joint. One of these transplanted PIP joints, in which the anastomosed vessel was obstructed, showed degenerative changes in roentgenograms taken 1 year later.

When the toe MP joint was transferred, we used some modifications of the transfer to gain further mobility.

After the MP joint was removed from the toe, it was transplanted to MP joint of the finger, turning over volar side to dorsal side. After 7.5 months, the patient obtained the improved range of motion of MP joint, −20° in the extension and 90° in flexion.

Fourteen Cases of Toe Joint Transfer. Yoshitsugu Tomita, Kagehisa Murota, Koichi Okubo, Fumito Takahashi, Keishi Marumo, Nobuyuki Nakamura, *Department of Orthopaedic Surgery, The Jikei University School of Medicine, Tokyo, Japan*

Fourteen cases of toe joint transfer have been performed since 1981. All cases except one are male and all cases were ankylosis of MP or PIP joint caused by trauma. Three of MP joints and twelve of PIP joints were replaced by vascularized toe joints.

Postoperative follow-up time ranged from 4 months to 2 years and 5 months.

These cases are divided into two groups, an excellent function group and a poor function group.

The average ROM of the excellent group is 55° and that of the poor group is 8°.

Tenolysis was added to six cases from the poor group and they obtained 35° of ROM.

In order to obtain excellent ROM after surgery, the palmar plate should be removed completely and insertion part of flexor digitorum brevis should also be removed and the tendon sheath of the flexor of the recipent site should be attached by firm suture to the plantar ligament of the toe joint. The grafted joint should be stabilized in full extension by K-wire during 2 weeks. Capener splint should be used for long term.

In this way were excellent results with good ROM of 10° to 80° obtained recently.

Our Experiences With the Free Scapular Flap. S. Takayanagi, T. Tsukie, *Division of Plastic Surgery, Kokura Memorial Hospital, Kokura (S.T.) Division of Plastic Surgery Osaka Red Cross Hospital (T.T.), Osaka, Japan*

The scapular flap has been used successfully in 16 cases. The dissection of this flap is easy, quick, and safe. The width of this flap is limited by the ability to achieve primary closure. The widest flap in our series was 11 cm. This flap is of intermediate thickness and a long vascular pedicle is obtainable. The longest pedicle in our series was 11 cm. In our clinical cases the scapular flap provided stable and durable skin cover.

The Free Lower Trapezius Muscle and Musculocutaneous Flap. Yu Maruyama, Kiyoshi Ohnishi, Itaru Kobayashi, Ryukichi Iino, Mitsuo Motegi, *Department of Plastic and Reconstructive Surgery (Y.T., K.O., I.K.) and Department of Orthopedic Surgery (R.I., M.M.), Toho University Hospital, Tokyo, Japan*

The trapezius muscle and musculocutaneous flap are versatile flaps in various reconstructions, and anatomically the trapezius can be elevated the three types of upper, middle, and lower. The lower trapezius muscle, including its overlying cutaneous vascular territory, receives the dominant vasculature of the descending branch of the transverse cervical artery. This musculocutaneous flap has the advantages of a wide arc of rotation, of obviating the necessity of detaching important upper muscle fibers that act as shoulder girdle elevation and retraction, of no risks of injury to the eleventh cranial nerve, and of being able to be a free flap donor site. We presented the surgical anatomy including some reconstructive cases of the free, lower trapezius flaps.

Free Rectus Abdominis Fasciocutaneous Flap. Yu Maruyama, Kiyoshi Ohnishi, Itaru Kobayashi, Seichu Cho, Goh Terashima, Setsuo Takeuchi, *Department of Plastic and Reconstructive Surgery (Y.M., K.O., I.K., S.L.) and Department of Second Surgery. (G.T., S.T.), Toho University Hospital, Tokyo, Japan*

The rectus abdominis musculocutaneous flap described by several authors has become one of the versatile flaps for reconstruction of the breast and the chest wall, and it has been suggested that it could be used a a free flap donor site.

However, in our cadaver investigations and clinical considerations, it is not necessary to include the rectus muscle in the flap, which can be elevated safely without muscle but with fascia as a fasciocutaneous flap.

These findings developed the new dimension of extensive use of a free fasciocutaneous flap.

We expound upon cadaver investigations, the operative procedure, and clinical applications of the newly developed free rectus fasciocutaneous flap with some clinical cases.

One-Stage Reconstruction of Soft Tissue and Major Vessel on Limb. T Okada, Y Yasuda, Y Mityama, N Ishikura, M Kojima, S Tsukada, *Kanazawa Medical University, Japan*

Soft tissue, including a major vessel, can be damaged in limbs, often leading to functional disturbances of the injured limbs and even to amputation, despite the limited extent. To save the injured limb, it may be ideal to reconstruct the soft tissue and the major vessel at the same time.

Case report: A 47-year-old man was caught in a hot press machine, sustaining a deep burn of his right, upper limb. The skin, muscles, nerves, and major vessels were destroyed. On the seventh day after the injury, a brachial artery was ruptured because of necrosis. The circulation of the distal limb was threatened. After the necrotic tissue was excised, a free posterior tibial flap based on a posterior tibial artery was transplanted. A posterior tibial artery was interposed between a brachial and a common interosseous artery. A saphenous vein of the flap was interposed between a cephalic vein and a brachial vein. A good circulation of the distal limb and a complete take of a flap were obtained.

Free Peroneal Flap. N Kuwata, K Doi, S Nakamura, H Kotani, S Sumiura, S Kawai, *Department of Orthopaedic Surgery, Yamaguchi University School of Medicine, Yamaguchi, Japan*

The peroneal flap is a new flap that is nourished by the direct cutaneous branches of the peroneal vessels. The large and thin flap, measuring a maximum of 14 × 7 cm, can be taken from the posterolateral region of the calf.

This flap also can be used as a circulatory monitoring flap of free vascularized fibulal, fascial, and sural nerve grafts.

Ten free peroneal flaps have been performed since March 1983. Five flaps were used as free vascularized skin flaps for closure of the skin defect, another five flaps as a circulatory monitoring flap

of the composite tissue transfer (one case of fibula graft, three of sural nerve graft, and one of fascia graft).

These monitoring flaps demonstrated the survival of the transferred tissue. All flaps survived completely without any complications.

This free peroneal flap has many advantages: 1) Thick and long vascular pedicle can be gained; 2) double flap with one vascular pedicle can be designed; 3) large flap can be designed; 4) flap is relatively thin and any shape of the flap can be designed; 5) this flap can also be used as the circulatory monitoring flap of the composite tissue transfer; 6) functional and cosmetic deficit of the donor site can be neglected; 7) free sensory flap can be available.