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tivity of 93% and a specificity of 98% for proximal vein DVT. Deep vein thrombosis is common in postoperative patients (20–50%) and results in pulmonary embolism in 10 to 15% of patients with DVT.1 The widespread, accepted use of duplex scanning for the detection of DVT acknowledges the need for noninvasive, less costly methods in the diagnosis of even potentially fatal conditions.

We have not proposed that MR imaging be the gold standard for the determination of obliteration of AVMs after stereotactic radiosurgery; rather, we stated that “the diagnosis of AVM patency after radiosurgery still depends on conventional cerebral angiography when only a small residual nidus remains.” Assuming that postradiosurgical MR imaging is 95% accurate, the number of quality-adjusted life years lost due to an undetected patent AVM equals that from the complications of angiography in only 1.5 years, if the expected complication rate of DSA is 0.3%. (J. Campbell and M. Rutigliano, personal communication.) Thus, we continue to advise our patients with AVMs to undergo follow-up DSA after radiosurgery to confirm obliteration of the AVM if MR imaging suggests obliteration. For patients with obvious void abnormalities detected on MR images 3 or more years after radiosurgery, we no longer advise routine diagnostic DSA. Instead, we encourage such patients to undergo follow-up DSA after placement of a stereotactic frame, thereby allowing repeated radiosurgery to be performed if residual nidus is detected. This protocol for performing follow-up DSA has reduced the number of unnecessary angiograms in our patients with AVMs.

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Hypoglossal–Facial Nerve Anastomosis


Although hypoglossal–facial nerve side-to-end anastomosis is a widely accepted and used procedure for restoration of facial movements, it is our opinion that the word “anastomosis” is wrongly applied in reference to nerves. It has been 17 years since the Journal of Neurosurgery published a letter by Rosegay and Edwards1 that detailed the correct terminology of different types of peripheral nerve repair. This letter focused on the confusion between the terms “fascicular suture,” “interfascicular suture,” “intr-terfascicular nerve grafting,” “grouped fascicular suture,” and “funicicular suture.” We have noticed, however, that the neurosurgical and microsurgical literature has continued to observe the incorrect terms for “nerve repair,” or the surgical procedure intended to restore the continuity of a (partially) divided nerve. These terms include the word “anastomosis,” found in many papers on experimental and clinical nerve repair, as well as “reanastomosis,” “suture,” “coaptation,” and “approximation.”

According to Stedman’s Medical Dictionary, the term “anastomosis” means an “operative union of two hollow structures.” This definition does not include solid structures such as nerves. “Suture” (to unite two surfaces by sewing) should also be avoided as a term for nerve repair, because it merely specifies the kind of technique by which the nerve ends are repaired rather than the process as a whole; the same rationale applies to such terms as “gluing,” “laser welding,” “fusion,” “tubulization,” and “wrapping.” With this argument in mind, “fibrin suture” is a contradiction in terms. “Coaptation” (the joining or fitting together of two surfaces) and “approximation” (tissue edges drawn into desired apposition for suturing) are also incorrectly applied to nerve repair, as they both refer to the drawing together of nerve ends without further mechanical stabilization; not surprisingly, this is very rarely the case in peripheral nerve repair. “Neurorrhaphy,” a term mainly popular in the 1950s and early 1960s, would be a very appropriate term, because it refers to the “joining together, usually by suture, of the two parts of a divided nerve.”2 However, this term excludes nerve repair not performed via suturing, such as techniques that use fibrin glue, laser, or other sutureless methods.

Terms that appropriately describe the whole process are “repair” (restoration of damaged tissue... artificially, as by surgical means), “reconnection,” or “reconstruction.” Fortunately, these terms are already used by many experts in nerve surgery. These terms can be preceded or followed by a specific term indicating the technique (such as epi- neural or perineurial) or material (including sutures and fibrin adhesive) by which the nerve repair is performed, or the sort of nerve repair (such as hypoglossal–facial nerve, cross–facial nerve, end-to-end, graft).

With current technical progress and developing subspecialties creating many new (pseudo)scientific words, we must be careful to use the most precise terminology possible. An incorrectly used term, once adopted, is very hard to eradicate from the language. This issue may also present a task for editors and reviewers of neurosurgical journals to correct wrongly applied terms for cranial and peripheral nerve repair.

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References


To THE EDITOR: We would like to comment on the arti-
icle by Sawamura and Abe (Sawamura Y, Abe H: Hypoglossal–facial nerve side-to-end anastomosis for preservation of hypoglossal function: results of delayed treatment with a new technique. J Neurosurg 86:203–206, February, 1997) in which the authors try to demonstrate that their technique can overcome the biological problems related to long-lasting facial paralysis and preserve hypoglossal function.

Hypoglossal–facial anastomosis is a well-known procedure used to reanimate the face. When it is performed early, for instance, within 6 months after facial nerve injury, results are good in terms of facial symmetry and voluntary eye closure. Recovery of the frontalis muscle is generally poor. The hemitongue atrophy that follows this procedure is variable in intensity and is generally well tolerated by the patients. Normally, dysfunctions in eating, swallowing, and speaking are not noted as a direct consequence of hemiglossal palsy. With the exception of patients with previous lower cranial nerve dysfunction, we believe that hemitongue atrophy is overemphasized by those surgeons who propose technical modifications of the conventional hypoglossal–facial nerve anastomosis. The first modified technique was the anastomosis of the descending hypoglossal branch to the distal stump of the hypoglossal nerve trunk. This technique probably represents the best option because facial reanimation is privileged over hypoglossal function and is attempted only to limit the hemitongue atrophy.

All the other modified procedures seem to be aimed mainly at limiting the hemitongue atrophy or hemiglossal dysfunction rather than at obtaining the best reanimation of the face using all the axons of the donor nerve. A technique that uses one-half of the hypoglossal nerve with or without interpositional nerve graft has been presented only in small series (Arai, et al., eight cases; Cusimano and Sekhar, one case) and to some criticism. May, et al., presented a more consistent series using a simple interposition of a nerve graft between the facial and the hypoglossal nerve trunk. This technique probably represents the best option because facial reanimation is privileged over hypoglossal function and is attempted only to limit the hemitongue atrophy.

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References

Response: I appreciate the opportunity to respond to the letters by Dr. Fernandez, et al., and Drs. Menovsky and Overbeeke regarding our recently published article, and I thank them for their comments.

I agree with the comments of Dr. Fernandez and colleagues that the hemitongue atrophy following classic hypoglossal–facial nerve end-to-end anastomosis is variable in intensity, is generally well tolerated by patients, and has been overemphasized by some surgeons. Nevertheless, the recent technical advancement of partial hypoglossal–facial nerve anastomosis, including our technique, enables us to preserve hypoglossal function with minimal, or even no tongue atrophy. Classic hypoglossal–facial nerve anastomosis sacrificing the hypoglossal nerve is now thought to be inferior to these more modern techniques that leave the hypoglossal trunk at least partially intact.

Another well-known modified technique is the anastomosis of the descending hypoglossal branch to the distal stump of the hypoglossal nerve trunk, which is used to restore hypoglossal function after facial nerve repair. This technique can theoretically preserve hypoglossal function. In reality, however, it has often resulted in hemiglossal atrophy with its dysfunction. This may be due to the great difference in the total number of myelinated fibers between the descending branch and the distal hypoglossal stamp.

I have been performing an anatomical study in collabo-
For a nerve-to-nerve anastomosis, both the AWAMURA Article 3, 1996 has mentioned previously. In addition, our S and 3 51–54, 1995, M.D. UTAKA ing" facial paralysis. Our recent experience with these techniques can also be used in patients with "short-stand-
niques.

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must be reinnervated from the hypoglossal trunk at the

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hypoglossal nerve is approximately 25 mm (unpublished

facial nerve and the high cervical anastomosis point on the
er, shows that the mean distance between the ansa of the

affect the postsurgical function of both the facial nerve

our technique aims not only at limiting hemiglossal dys-
function, but also at obtaining the best reanimation of a

ated face.

As Fernandez and colleagues have mentioned, the key
to the success of our technique may be that the anatomical
level of the anastomosis is more proximal than that used
in classic techniques for the facial nerve. Currently, I can-
ot discuss the electrophysiological data for the method
by which the anatomical level of the anastomosis may
affect the postsurgical function of both the facial nerve
and the hypoglossal nerve. Our anatomical study, howev-
er, shows that the mean distance between the ansa of the
facial nerve and the high cervical anastomosis point on the
hypoglossal nerve is approximately 25 mm (unpublished
data). Throughout this distance, the paretic facial nerve
must be reinnervated from the hypoglossal trunk at the
extremely high cervical portion. This distance is, how-
ever, shorter than that required in other reported tech-
niques.

Although the series that we presented was small, this
technique can also be used in patients with "short-stand-
ing" facial paralysis. Our recent experience with these

patients shows that the recovery of facial nerve function is
faster in patients with short-standing facial paralysis than
in those with long-standing facial paralysis (unpublished
data). As more surgeons become experienced with our
technique, its value will become apparent.3

I agree with the point made by Drs. Menovsky and
Overbeke that the word “anastomosis” is wrongly ap-
piled in the context of nerves. According to Stedman’s
Medical Dictionary, the term anastomosis means an “op-
erative union of two hollow structures.” While this defi-
nition does not apply to the union of solid structures such
as nerves, it is also true that the definition of medical
terms can change over time.

Table 1 represents a search covering the last three de-
cades from Medline; the results reveal the use of medical
terminology relevant to this discussion. The key words
shown in the table were searched in both titles and ab-
stracts from the literature. There are 4988 articles con-
cerning the facial nerve. Of these, only eight papers use
the term “neurorrhaphy” which Menovsky and Overbeke
have suggested as the appropriate term for nerve repair by
means of sutures. They have also argued that the terms
that appropriately describe the entire process are “repair,”
“reconstruction,” or “reconnection.” As can be seen in the
table, the term “reconnection” has been used in only one
paper in 30 years.

In contrast, the term “anastomosis” appears in 155 pa-
pers concerning the facial nerve, 113 of which were writ-
en in English and 92 of which were human studies. The
term “repair” appears in 134 papers concerning the facial
nerve, 108 of which were written in English and 78 of
which were human studies. The term “reconstruction” ap-
pears in 114 papers concerning the facial nerve, 79 of
which were written in English and 75 of which were hu-
man studies. Twenty-four of the 108 papers using the term
“repair” also used the term “anastomosis” for the surgical
procedure and nine of the 79 papers using the term “recon-
struction” also included the term “anastomosis.” “Anasto-
mosis” may be the most popular term for facial nerve
surgery among surgeons during this period. “Repair” is
likely to have been used more broadly than “anasto-
mosis.”

It is important to be as precise as possible in using cor-
rect terminology; however, once a term such as “anasto-
mosis” has been adopted, it may be too difficult to elimi-
nate its use. We may have to accept the use of the medical
term “anastomosis” to indicate the operative union of two
“solid” structures such as nerves.

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J. Neurosurg. / Volume 87 / October, 1997
To THE EDITOR: The article by Mr. Sgouros and my late good friend Bernard Williams (Sgouros S, Williams B: Management and outcome of posttraumatic syringomyelia, J Neurosurg 85:197–205, August, 1996) contains the expected didactic and controversial view that “it would be overly dogmatic to state that drains have no place in the treatment of syringomyelia.”

To state that decompression and drainage of cerebrospinal fluid pathways is the first line of treatment of posttraumatic noncystic myelopathy (with complete or incomplete spinal cord lesions) does not address the fact that in the event of very high pressure and rapid neurological decline related to this condition, the cause is a valve-like mechanism at the site of trauma, which is nearly always anterior to the spinal cord. This article also ignores the only in vivo study that has demonstrated the inherent collapsing pressure of that pathway.1

In my opinion, combining careful exploration at the site of trauma (if below T-1) with syrinx shunting is a more acceptable approach: if this treatment is not possible, I have found that fine tube syrinx shunting is the least traumatic procedure. I must also note that the authors do not address the problem of incomplete cord lesions with a syrinx above and below the level of damage.

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Reference

RESPONSE: I read with interest Mr. Davis’ letter on the management of posttraumatic syringomyelia. The treatment of this complex disorder has always attracted controversy and, as in many other fields, the acceptance of views that depart significantly from the established, traditional mainstream is rarely forthcoming.

There is no doubt that in the majority of cases the subarachnoid block is anterior to the spinal cord, at the site of the posttraumatic kyphosis, as well as around and dorsal to the cord. As our paper clearly indicates, the surgical technique of subarachnoid space reconstruction involves generous laminectomy and dissection of subarachnoid adhesions to establish communication with cerebrospinal fluid (CSF) spaces above and below the site of the block. This dissection is extended as far as possible around the cord from both sides to recreate the subarachnoid space anterior, lateral, and dorsal to the cord. Clearly, in very severe cases this procedure may not prove feasible, which could well account for the fact that the surgical technique described has not achieved a 100% success rate.

Our previous article clearly demonstrated that syrinx shunting has a high failure rate over the long term because it does not address the filling mechanism of the syrinx.1 Much as this finding may contradict any preconceived ideas, the evidence presented cannot be ignored. The hydrodynamic effect of placement of a shunting tube from the syrinx cavity to a “low pressure” site has never been shown scientifically and we do not know if this procedure can restore the normal CSF flow dynamics. Shunting used in other CSF circulation disorders has a poor track record in general, despite extensive research. I fail to see why we should continue to use this procedure in syringomyelia if there is a more effective alternative strategy.

Although sporadic clinical observations are important, the assessment of a treatment strategy requires an unbiased scientific approach to the facts. Now that dynamic magnetic resonance imaging is becoming widely available, there is an opportunity to study CSF dynamics in syringomyelia, better understand the operative pathophysiological mechanisms, and devise better treatment strategies.

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Reference

Endodermal Sinus Tumor and Spinal Cord Compression

TO THE EDITOR: We were greatly interested in the article by Resnick, et al. (Resnick DK, McLaughlin MR, Albright AL: Primary endodermal sinus tumor presenting with spinal cord compression. Case report. J Neurosurg 86:151–153, January, 1997). The authors presented their case and extensively reviewed endodermal sinus tumors and spinal cord compression. We would like to stress some points in regard to their article.

Because this condition is rare, only a few cases of spinal cord compression attributed to endodermal sinus (yolk sac) tumor have been reported;1, 2 the authors stated that only two cases of metastatic endodermal sinus tumors presenting with spinal involvement were noted in the literature. Unfortunately, they overlooked our article.2 In this article, we reported the case of a 4-year-old boy who was admitted to our department with a 10-day history of progressive paraparesis and neurogenic bladder. He had undergone an operation 6 months prior to admission because of a testicular mass. Histopathological examination showed an endodermal sinus tumor of testis. As seen in Fig. 1 of our article, the tumor was located in the T11–L1 region. Tumor tissue filled the epidural space like a cuff. The preoperative a-fetoprotein level in serum was 350 ng/ml (normal range 2–10 ng/ml). Endodermal sinus tumors secrete a-fetoprotein, which can be detected in over 80% of patients; therefore, a-fetoprotein can be used as a reliable marker in the diagnosis and follow up of the disease.

The best-known treatment for endodermal sinus tumor is cytoreductive surgery followed by multiagent chemotherapy and radiation therapy. In our case, we used a