SEAMDURA, the bioabsorbable artificial dural substitute, was approved in autumn 2007 and went on sale in April 2008 in Japan, and Dr. Fumio Yamaguchi, Department of Neurosurgery, Nippon Medical School Hospital, has given his ideas about his experience of using the product when he first made use of it immediately after its market debut and about its use in plastic surgery of the dura mater.

Usage Experience of SEAMDURA, the bioabsorbable artificial dural substitute
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[Introduction] The dural plasty is a form of surgery sometimes required in craniotomy. In removal of meningioma, in particular, it is essential to properly excise the areas adjacent to the tumor in order to reduce the risk of recurrence. As this result in an enlarged defect of the dura mater, it is not possible to make up the loss with the autologous tissues such as fascia or periosteum, so that in many cases the artificial dura mater is used. At one time, a freeze-dried dura mater of the donated human cadaver was used but this practice was prohibited in connection with the issue of Creutzfeldt-Jakob disease. Later, materials such as a non-absorbable artificial material, expanded polytetrafluoroethylene (ePTFE) or a bioabsorbable polymer material, polyglycolic acid (PGA) came into use as prosthetic materials. The use of ePTFE did, however, give rise to the issue of cerebrospinal fluid (CSF) leakage from the needle holes after suturing. This necessitated the use of suture threads of the same material and the use of fibrin glue to overcome the incidence.

The presently used bioabsorbable artificial dural substitute, SEAMDURA, has a structure in which non-woven polylactic acid fabric is inserted in the internal reinforcement part between lactide-caprolactone copolymer films. The principal feature of this product is that it is bioabsorbable so that it will be absorbed and thereby degraded in roughly 8 months after placement. In this process, the material is substituted by the patient’s autologous collagen being reinforced, which reduces the risk of foreign body reaction.

[Case report] The patient, male, 26 years of age, presented with a convexity meningioma of the right side, on the head MRI film showing that onset was due to a secondary generalized seizure (Photo1). After resection of the tumor presence of a dural tail adhered to the dura mater was confirmed under navigation. Following this, the dura mater was excised so as to include this dural tail. The dural defect had a roughly circular shape and could not be covered even with a large-size SEAMDURA (5x15cm). It was therefore cut into halves, and these halves were then aligned and sutured carefully to join the missing dura mater area together (Photo2). In contrast to the conventional artificial dural substitute, there was relatively little distortion in the sutured area as SEAMDURA has a gentle curvature and fits favorably on the brain surface. SEAMDURA is also characterized by the fact that as a semitransparent material it is possible to continuously observe the brain surface while suturing is performed. During the dural plasty it was possible, also in this patient, to detect blood in a tumor resection cavity and on the brain surface (Photo3). When washed with physiological saline solution, however, it was known to be not bleeding but retained blood. While, furthermore, the astral lamp has a strong light reflection in the case of white materials such as ePTFE and causes a photophobic sensation to the surgeon, this phenomenon did not occur with the semitransparent SEAMDURA material. After surgery, neither vital nor neurological abnormality was noted, and the only changes that did occur were those generally known by the blood test after surgery. The MRI film showed no evidence of any particular postoperative abnormalities in the area dural plasty was applied (Photo4). Although over three months have meanwhile elapsed since the surgical intervention no abnormal findings, including epileptic attacks, have been detected.

[Conclusion] The first impression that can be mentioned with regard to the present use of SEAMDURA for the dural plasty is that it is made of a material that is easy to handle. It can easily be cut with scissors to a shape fitting the dural plasty area and 4-0 Neurone® thread with the needle used for suturing the autologous dura mater passed through the material easily and smoothly. Since, furthermore, no leakage of spinal fluid from the needle holes was encountered there was also no need to use fibrin glue. It is considered important, particularly with this case, to follow up for a prolonged period of time, seeing that this material has little biological reactivity.

Yet, size variation may be added as an issue associated with this product. Since it is necessary in case of convexity meningioma to perform dural plasty which does occasionally have a large surface area, it is desirable to have large sizes of around 10x10cm and 15x15cm in addition to the size currently provided, seeing that this would dispense with unnecessary works and also help to reduce risk of CSF leakage and else. While it is felt that according to the particular case there are various options for the dural plasty, we believe that this product will be used more frequently in the near future because of its handiness.