
Persistence of Bioglue® in spinal dural repair

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Summary Bioglue® is an organic surgical adhesive commonly used in vascular and cardiopulmonary repair surgery. It has been used in neurosurgical procedures to minimise the risk of cerebrospinal fluid leak. We report a case which demonstrates persistence of Bioglue® at the repair site two years after its successful use in aiding dural closure after a lumbar decompressive procedure.

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INTRODUCTION

Bioglue® is an organic surgical adhesive composed primarily of bovine serum albumin and glutaraldehyde. It is commonly used in vascular and cardiopulmonary repair surgery and has recently been used in neurosurgical procedures where the risk of cerebrospinal fluid leak is high.¹ Other adjunctive glues, consisting mainly of fibrin or cryanoacrylate, have caused concern due to immune reactivity and local tissue toxicity with impairment of wound healing. No major long-term studies of the use of Bioglue® have been published to date. This case report demonstrates not only successful dural tear repair assisted by Bioglue®, but also its inert persistence, two years after application during lumbar disc surgery.

CASE REPORT

A 60-year-old female with non-insulin dependent diabetes mellitus presented with left sciatica in October 2003. She had previously undergone an L5/S1 laminectomy for lumbar canal stenosis in 1985 and an L4/L5 laminectomy and discectomy for disc prolapse in October 2001. In the latter operation, Bioglue® had been used, in addition to suture apposition, for repair of a



Fig. 1 Axial CT scan of the lumbar spine revealed a recurrent left paracentral L4/L5 disc prolapse and previous L4/L5 laminectomy.

small dural tear. Post-operatively, there was no CSF leak. She was pain-free for 20 months until this onset of sciatica associated with signs of a left L5 radiculopathy.

A CT scan of the lumbar spine showed marked lateral recess and foraminal stenosis, affecting principally the L5 nerve root, and related to osteophyte formation and recurrent disc prolapse (Fig. 1). Claustrophobia precluded an MRI. Re-operation for decompression of the left L5 nerve root was recommended. At operation, the left L5 hemilaminectomy was extended and the recurrent L5/S1 disc prolapse excised. Modest epidural adhesions were noted relating to the previous surgery. Small fragments of Bioglue® were found adjacent to the dura, which macroscopically appeared healthy and intact. These fragments were not encased in fibrous tissue and were easily removed from the dura. Histology confirmed that Bioglue® fragments consisted of amorphous red plastic material and no evidence of inflammation or inflammatory cell infiltration was seen. There were no operative or post-operative complications.

DISCUSSION

Bioglue® surgical adhesive, a mixture of purified bovine serum albumin (45%) and glutaraldehyde (10%), is commonly used as an adjunct in vascular and cardiopulmonary repair surgery for haemostasis, tissue adherence and strengthening.^{2,3} It is simple to prepare and apply and begins to bond within 20–30 s, reaching its maximum bonding capability in 3 min.⁴ It was approved by the Food and Drug Administration (USA) in 1999 to facilitate surgical repair of acute thoracic aortic dissection.

More recently, it has been used for reconstruction of the sellar floor following transphenoidal procedures¹ and other neurosurgical procedures, where the potential for leak of CSF is high.⁵

Adjunctive glues commonly used at present include fibrin glue and cyanoacrylate. However, antifibrinolytics incorporated into some fibrin glues have been associated with seizures in animal models⁶ and cyanoacrylates have been found to induce acute and chronic inflammation and cytotoxicity.⁷

Bioglue® used for sealing pulmonary parenchyma and bronchial anastomoses has been associated with healing not considerably impeded by foreign body reaction or tissue granulation.⁸ Its

use has also been associated with a significant reduction in seroma formation in the rat mastectomy model.⁹ One study, however, in which Bioglue® was used to reapproximate layers of a type A dissected aortic root during emergency surgery, showed histopathological tissue necrosis at the site of Bioglue® application in all patients who redissected. This was considered to demonstrate that glue should be used as an adjunct to tissue apposition rather than as a primary closure technique.¹⁰ Studies on the long-term effects of Bioglue® on surrounding tissues are yet to be published.

Bioglue® was shown in this case, after two years, to be present unaltered and not associated with any local tissue toxicity nor inflammatory, foreign body or allergic reactions.

Points of note in this case are:

1. Bioglue® was associated with a modest degree of epidural fibrosis, although we considered this not to be more than would be typically found post-operatively where Bioglue® had not been used.
2. Bioglue® was associated with complete dural healing.
3. Despite its organic nature, fragments of Bioglue® have been noted to persist after two years.
4. There were no chronic inflammatory changes around persisting Bioglue® fragments.

CONCLUSION

We report a case where Bioglue® was found to be a useful adjunct for repair of a lumbar dural tear. Despite persisting fragments after two years, no complications of the Bioglue® itself were noted. We consider Bioglue® to have significant potential to aid dural repair and although it may persist for years in an inert state, we have not noted it to induce a fibrotic reaction additional to that of normal healing. We have not used Bioglue® intradurally and its safety in this situation is as yet unknown.

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