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Case report

Delayed perforation of posterior pharyngeal wall caused by dislodged bioresorbable interbody cage. Case report

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ABSTRACT

A 48-year-old man was admitted for the management of congenital anomalies: Arnold–Chiari type I malformation combined with odontoid upward migration. He also had degenerative stenosis of the spinal canal by spurs at C2/C3 and C3/C4 levels. Osseous deformities caused ischaemic changes of the brainstem as well as spinal cord compression. Authors used the Biocage – interbody cage covered by bioresorbable layer to fill the surgically created gap after removal of the right part of C3 vertebral body. Twenty-seven months after implantation, the implant was extruded through posterior pharyngeal wall. Authors describe this unusual case and discuss possible causes of Biocage extrusion.

1. Introduction

Historically, the first methods of anterior decompression of the cervical spinal cord used bone grafts as the material for interbody fusion [1,2]. As an alternative way, implantation of cages made of metals or synthetic materials has been proposed instead of bone grafts [1–4]. Bioresorbable implants made of lactic acid polymer were introduced in 1966 to stabilize long-bone fractures, and later were adapted to spinal surgery [3]. Their inherent properties entail gradual resorbtion in physiological milieu [3–6] and elastic modulus more similar to the bone than that of titanium or nonresorbable polymers [5,6]. The cervical bioresorbable cage – Biocage (Cousin Biotech) is tubular in shape, and slightly bent to imitate cervical lordosis [7]. The wall of the tube is radiolucent, made of polyester mesh tissue, and impregnated with solution of poly-L-lactic acid (PLLA). The elasticity of both materials reduces the stress-shielding effect. To enable X-ray detection, the longitudinal radiopaque fibre is inserted into the wall [7]. After implantation, the PLLA is gradually resorbed, permitting bone penetration into perforations of the polyester wall [7]. Söderlund et al. implanted Biocage combined with anterior screw-plate system in seventeen patients. After a mean follow-up of thirty months, he concluded that fusion was complete in five cases and probable in ten others, whereas in

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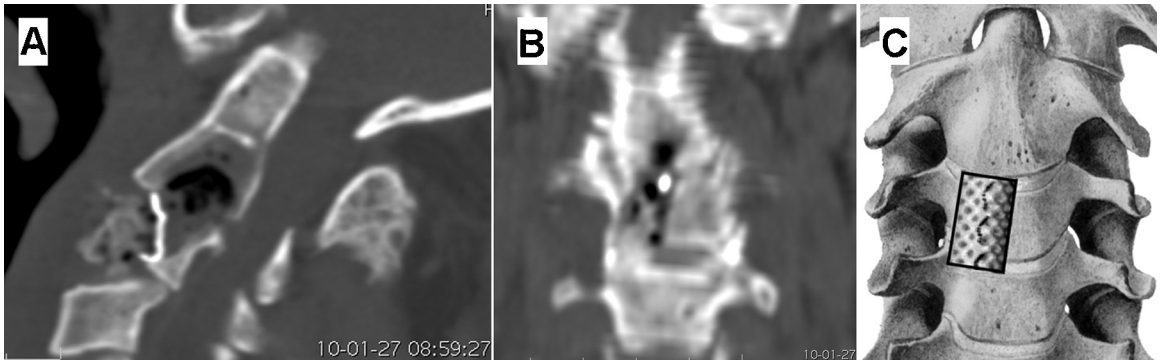

Fig. 1 – CT of the cervical spine performed two days after Biocage implantation. Sagittal (A) and frontal (B) image reconstructions, with schematic drawing (C), demonstrating the position of Biocage (note the presence of radiopaque fibre).

two cases the implant did not fuse [7]. Based on encouraging results published by Söderlund et al., we used the Biocage to fill the surgically created gap in the right part of C3 vertebral body. Twenty-seven months after implantation, the Biocage was extruded through posterior pharyngeal wall. We describe this unusual case and discuss possible causes of Biocage extrusion.

2. Case report

A 48-year-old man was admitted for management of Arnold–Chiari type I malformation combined with odontoid upward migration. He also had spinal cord compression by spurs at C2/C3 and C3/C4 levels. Osseous deformities caused ischaemic changes of the brainstem as well as spinal cord compression. According to Nurick scale, the patient's neurological status was assessed as grade IV. He underwent consecutive operations: (1) in July 2009 and in October 2010, subtotal odontoidectomies by transpharyngeal approach – during both procedures total removal of the odontoid peg was not successful due to important bleeding; (2) in January 2010, discectomies of C2/C3 and C3/C4 with removal of the right part of the C3 vertebral body, followed by C2–C4 spondylodesis with Biocage (Fig. 1); (3) in May 2010, decompression of the posterior fossa with C1–C4 laminectomies followed by stabilization between occiput and C7. Computed tomography (CT) examinations (April and October 2010) revealed stability of the Biocage (Fig. 2). The patient was reviewed at follow-up examinations demonstrating improvement to Nurick grade III. In May 2012, he arrived declaring that an odd-looking object had expelled through his mouth during severe cough after two days of dysphagia – in fact it turned out to be a Biocage (Fig. 3). There was no history of trauma or fever. Oropharyngeal examination revealed wound of the posterior pharyngeal wall measuring 1 cm × 2 cm, situated beneath the cicatrised incision used for odontoidectomy (Fig. 4). Complementary investigations showed 4200 leukocytes per mm^3. Computed tomography disclosed absence of the Biocage in the place of implantation (Fig. 5). Treatment was started by intravenous antibiotics (amoxycillin plus clavulanic acid and metronidazole). The following day the wound was sutured by an otolaryngologic surgeon. The patient was fed by nasogastric tube for nine days. Despite there being no suppuration, the antibiotherapy was continued, combined with Octenidine oral gargles. He was discharged after healing of the wound. Otolaryngologic follow-up revealed cicatrisation of the posterior pharyngeal wall.

3. Discussion

In order to elucidate the possible cause of Biocage migration, we tried to analyze if this complication might arise from surgical error or other factors. Regarding the surgery, the Biocage was fit to the size of surgically created space between C2 and C4 and tightly placed in its interior. Lack of complementary anterior instrumentation does not explain delayed lack of fusion. Reinforcement of the Biocage by anterior screw-plate system was planned; however, intraoperatively it was ruled out due to

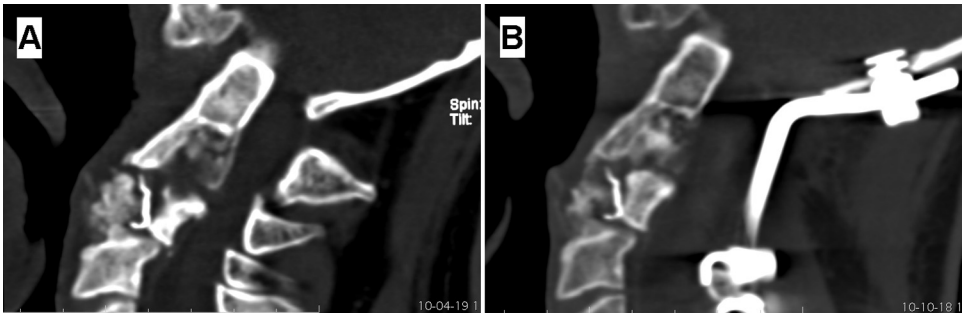

Fig. 2 – Control CT images performed three months (A) and nine months (B) after implantation. There are no signs of Biocage displacement.

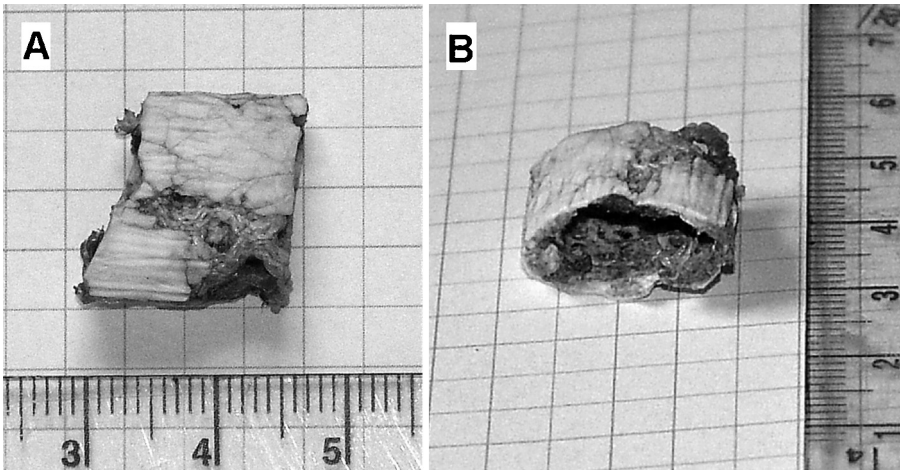

Fig. 3 – The photographs demonstrating extruded Biocage. (A) The wall of Biocage showing partially uncovered polyester mesh tube and (B) bony material inside the tube. The length of extruded implant is 17–14 mm whereas the transverse cross-section is elliptic with diameters 17 and 8 mm.

several reasons: limited range of patient's head motion made surgical access to C2 and C3 levels difficult, and two previous transpharyngeal operations had left a scar between posterior pharyngeal wall and C2 vertebra thus denudation of C2 vertebral body for plate screwing carried the risk of pharyngeal perforation. Posterior occipitocervical stabilization took place three months later. Comparison of CT sagittal reconstructions (Fig. 2), performed before and after occipitocervical instrumentation revealed that position of Biocage did not change, thus manoeuvres associated with posterior surgery can be ruled out as potential mechanism of destabilization. In the light of facts mentioned above, we came up with the following explanation of Biocage migration: the biodegradation of PLLA was not followed by sufficient bone infiltration of remaining polyester mesh. As a consequence, the implant became loose and eroded the posterior pharyngeal wall.

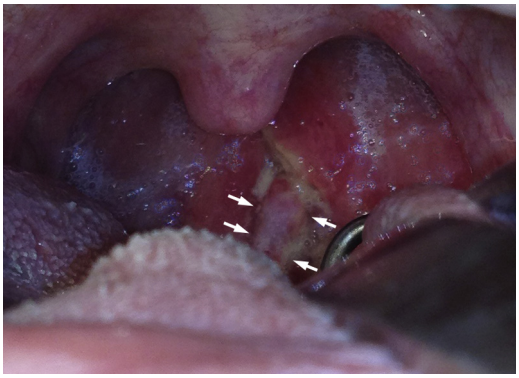

Fig. 4 – Intraoperative photography, demonstrating posterior pharyngeal wall with the wound made by Biocage (arrows).

Delayed penetration of the implant used for anterior cervical fusion into oropharynx is considered as a rare complication of such surgery. In majority of cases reported in the literature, the screws from plating systems migrated through pharyngeal or oesophageal wall and were extruded orally or were eliminated through the gastrointestinal tract [8–14]. Fountas et al. [15] in their series of 1015 patients observed 1 case (0.1%) of oesophageal perforation by dislodged screw. Extrusion of larger implant is extremely rare. In 1996, Cavanagh reported delayed oral extrusion of synthetic C4–C5 graft (14 mm × 8 mm), made of polymer [16]. In 2001, Sharma reported delayed pharyngeal perforation and oral extrusion of C2–C3 acrylic graft with Kirschner's wire [17]. In 2000, Fujibayashi reported an asymptomatic migration of

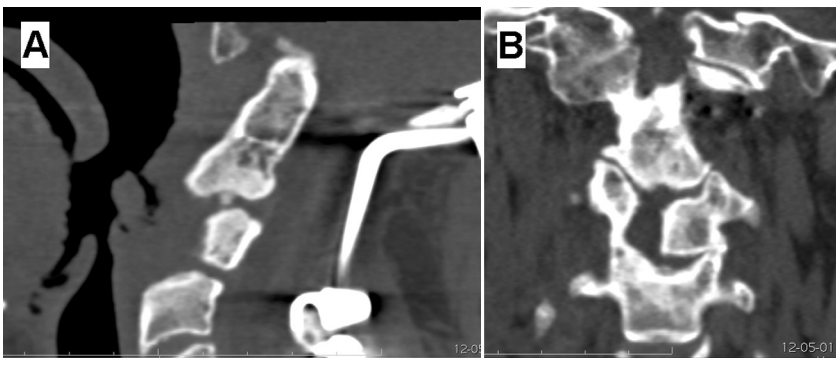

Fig. 5 – CT of the cervical spine performed few hours after extrusion of Biocage. Sagittal (A) and frontal (B) image reconstructions, demonstrating absence of implant in surgically created space between C2 and C4.

cervical 25-mm plate with four screws through pharyngeal wall, implants were eliminated through the gastrointestinal tract [18]. We report an oral extrusion of a relatively large cage (17 mm × 17 mm × 8 mm) covered by bioresorbable layer. What is curious in our case is that control CT performed nine months after implantation evidenced properly positioned Biocage. Extrusion took place twenty-seven months after implantation, when integration of Biocage with surrounding bone could be expected; moreover, stability of Biocage was assured by posterior occipitocervical instrumentation. In opinion of some authors, possibility of a delayed migration or an extrusion of bioabsorbable implants is reduced because the devices dissolve [3–6]. As such implants are the developing branch of biomaterials [5], there are few data about complications associated with their use. To our best knowledge, oral extrusion of bioabsorbable cervical implant has not been previously reported.

Conflict of interest

None declared.

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None declared.

Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals.

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