Management of Jaw Injuries in the American Civil War: The Diuturnity of Bean in the South, Gunning in the North

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ABSTRACT

James Baxter Bean published a series of articles in the *Southern Dental Examiner* in 1862, describing his work with “plaster and its manipulations.” This early experience included a new way of managing jaw fractures, with customized splints uniquely based on pretraumatic occlusion. Bean’s oral splints and their method of construction, using an articulator, became the standard of care in the Atlanta region during the American Civil War and, by 1864, throughout The Confederacy. In short course, Bean’s approach also swept The Union, following in large part the efforts of a colleague in the North, T.B. Gunning. Thus, what began in the early 1860s in a dental laboratory in the southeast swept the continental United States and revolutionized management of jaw-fractures during, and immediately after, the American Civil War.

KEYWORDS: Jaw fracture, articulator, oral splint

The desideratum, in treating fractured jaws, is to retain the fractured extremities in close and perfect apposition, thus maintaining the exact antagonism of the teeth, until provisional callus is thrown out, and union is effected. (Edward N. Covey, Medical Inspector, Confederate Army, 1866)

A forerunner of intraoral splints was developed by Richard Wiseman during the English Civil War (1642); he reduced a fracture of the maxilla with his hands, and patient and family maintained the reduction with a short-handled, Y-shaped wooden spatula.¹ In 1771, Desault and Chopart introduced a cork-and-tin splint for fractures of the mandible that was fully contained within the oral cavity.² The Desault-Chopart appliance was not significantly modified over the ensuing decades, except perhaps with the introduction of gutta-

percha, a resin derived from latex (and resembling rubber), by Hayward and others in 1845.^{3,4} It was several more decades (1862 to be exact) before James Baxter Bean used plaster dental models that, when sectioned and placed on an articulator, formed the basis for an intraoral splint. The Bean splint restored pretraumatic occlusion of the injured and promoted accelerated healing.

THE DISCOVERY

Bean (Fig. 1) was born July 19, 1834, in eastern Tennessee, attended Washington College in Limestone (in the tri-cities area of the State), and in 1860 graduated from the Baltimore College of Dental Surgery.⁵ He briefly practiced in Micanopy, Florida (south of Gainesville), and it was from there that he authored articles on “Plaster

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Figure 1 James Baxter Bean pictured after the American Civil War, before his death in 1870. (Photo courtesy of the National Library of Medicine, Washington, DC.)

and its [Dental] Manipulations.” While awaiting publication of his four-part series in the *Southern Dental Examiner* in 1862,⁶ Bean moved to Atlanta, Georgia, to be closer to the South’s only dental supply house, Brown & Hape, and to enjoy the stability of transactions in Georgia currency or in gold-and-silver coin.^{7,8}

By the summer of 1864, the South’s leadership had vacillated on a Confederate Army proposal to invade and split the North,⁹ and Sherman, taking the initiative, was poised to thrust through the heart of Georgia, to divide the Confederacy by marching to the sea. In vogue at the time, management of fractures of the jaws called for manual reduction and stabilization by means of a gutta-percha splint,^{4,10–12} depicted well, by example, in an 1864 report of Watkins Burton,¹³ a dentist assigned to Jackson Hospital, Richmond, Virginia. A Confederate soldier of the 53rd Georgia Regiment, James Hutchinson, had suffered a fracture of the left maxilla between the first and second premolars. Burton wrote: “After forcing the fracture into position, gutta-percha softened in warm water was pressed on the teeth [including] the fractured portion, and the jaws closed in occlusion. The impression was then carefully removed and placed in cold water” to harden. “The material [after reinsertion],” Burton added, “afforded a pleasant rest to the jaw [during healing], and left an opening through which food might be received, and at the same time not be affected by the secretions of the mouth, or by discharges from

the wound.” In vogue also, because of the need for practicality, were splints made of pasteboard softened with vinegar.¹⁴ Circumferential dressings, such as the Barton or the Hamilton bandage, added a modicum of stability.^{15,16}

It was in this setting in June of 1864, during visits to hospitals in Atlanta, Georgia, that Edward N. Covey, the Medical Inspector of the Confederate Army, learned of James Baxter Bean and his novel approach, initiated first in 1863, for management of fractures of the jaws. Covey described Bean’s approach in 1866, some 10 months after cessation of the war, in the inaugural issue of the *Richmond Medical Journal*:

1. Bean first took “wax impressions of the uninjured jaw and separately each fragment of the broken jaw, as soon after the injury as the condition of the parts permitted.”
2. From these impressions, Bean “then produced casts of plaster of Paris, giving as perfect representations of the teeth as possible.”
3. “The plaster models were next antagonized in their normal [occlusal] position, in an articulator” (Fig. 2).
4. The “fragments of the model representing the broken jaw were trimmed, placed in their proper antagonism, and held in position with wax” (Fig. 3).
5. “The articulator model was then imbedded in plaster and packed with rubber gum.”
6. “The gum was finally separated and by heat, thoroughly vulcanized,” creating the Bean splint (Fig. 4).

After “some adjustments” and after insertion of the splint, the jaws “came together in their most natural and easy position,” Covey wrote, and an “occipital-frontal linen bandage [probably the Hamilton] was applied in most cases,” to maintain anatomic position of the broken fragments.^{17,18}

Upon receiving Covey’s and other reports describing Bean’s prowess and successful outcomes,^{17,19–22} the Surgeon General of the Confederate War Department directed Bean to report to Army Headquarters, in Richmond, Virginia. There, before the Medical Board, Bean described his unique, occlusion-based methodology. A month later, a circular by J. Carrington, the Medical Director of Virginia, mandated that all soldiers in the Confederate theater with jaw injuries be directly or indirectly transferred to the care of Dr. Bean, centered at Robertson Receiving-and-Wayside and other Richmond and Petersburg, Virginia hospitals.^{8,17,18}

After the fall of Atlanta to Union forces, the management of jaw injuries was relocated to a dedicated ward at the Blind School Hospital in Macon, some 90 miles south of Atlanta. Personnel and the resident dentist there were already versed in the ways of Bean.^{17,19,23}

Figure 2 An illustration of the articulator developed and utilized by Bean.¹⁷

A COLLEAGUE IN THE NORTH

Bean's articulator-based splint was the first of its kind by some 6 to 7 years and is well documented in the meticulous dental records of the Confederacy. The published report in the *Richmond Medical Journal* (by

Covey¹⁷) in February of 1866, immediately following the war shared the methodology with the dental profession at large.

The originality of Bean's work and that of purported competitors, such as Thomas Brian Gunning of

Figure 3 An illustration of fragments of the mandible after gunshot, prealigned with wax. (Image taken from Covey.¹⁷)

Figure 4 An illustration of the Bean splint, made of hardened rubber gum. (Image taken from Covey.¹⁷)

New York City (Fig. 5), can now be confirmed because of the availability of digital copy of rare collections. A review of this recently available literature indicates the following:

1. The means by which Gunning became aware of Bean's technique is unclear. The possibility of a Union spy at Bean's open presentation to the Medical Board, at Confederate Army Headquarters in Richmond, Virginia can be speculated. More probably, however, Union forces retained a copy of the circular issued by the Medical Director of Virginia,

Figure 5 Thomas Brian Gunning pictured after successful delayed management of a fracture of the mandible of William H. Seward, Secretary of State, using an occlusive splint of the lower jaw secured with screws. (Photo courtesy of the National Library of Medicine, Washington, DC.)

J. Carington, describing and mandating the use of an articulator in the construction of vulcanite splints, and then referred it on, through proper channels.

2. The publications in the *Southern Dental Examiner* (by Bean, in 1862⁶) and the *Richmond Medical Examiner* (by Covey, in 1866¹⁷), preceded by 6 and by 2 years, respectively, the series published (by Gunning) in the *American Journal of Dental Science* in 1868.²⁴
3. The original Gunning splint of a single jaw did not involve an articulator and was secured in place by screws driven through the gingiva and into the bony stock of the mandible; Gunning used this method on April 27, 1865 (originally thought to be in 1864), to manage a fracture of the mandible of Secretary of State, William H. Seward.^{25,26}
4. Gunning's successful management of a 36-year-old male with bilateral fractures of the mandible in August of 1866 was 6 months after Covey's review in the *Richmond Medical Journal*.²⁴

THE REST OF THE STORY

After his service to the Confederate Army, Bean returned to Baltimore, the center of his dental training. There, he developed a method of casting aluminum denture bases and invented an apparatus for simplified manufacture and administration of nitrous oxide.⁸

In 1866, Bean became one of the founders of the Maryland State Dental Society, and, recognized for his seminal management of jaw fractures, served as its president, beginning in 1868.⁸ Bean's contributions were prescient, and his method of articulator-based splint construction persists today (Fig. 6).

Unlike Richard Wiseman after the English Civil War (1641 to 1648),¹ Gunning after the Civil War (1861 to 1865),²⁴ and Harold Gillies after World War I (1914 to 1918),²⁷ Bean did not publish the breadth of his prewar, wartime and postwar experience. More like Stephen Crane (*Red Badge of Courage*) and John Keats (*To Autumn*),^{28,29} Bean died at an early age (36) and lost the chance to further publish, when a Smithsonian expedition to Mount Blanc encountered a weeklong snowstorm in 1870. The death of Bean and nine colleagues at the highest summit of the Alps (Mont Blanc) near the French border³⁰ is legendary in the annals of mountaineering history.* The Bean articulator splint, often mistakenly identified as the Gunning splint, is less recognized in the annals of craniomaxillofacial history.

*Bean is buried in the Protestant Cemetery in the Chamonix Valley, in the Haute-Savoie region of France.⁵ Chamonix is bordered by Switzerland and Italy and dominated by the incredible Aiguilles de Chamonix chain of mountains that peaks at the summit of Mont Blanc.

Figure 6 (A, B, C, D) Photographs of current, sectioned plaster casts held in place with wax, before and after being placed in an articulator. (Provided by Larry Cunningham, D.D.S.)

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