

Bracing System for Pectus Carinatum - The Pectus emBrace™

Courtney M Willson¹, BSE

¹ Research and Development, Cureventions- Phoenix, USA

Outcome of New Pectus Bracing System with Revolutionary Dynamic Technology

GENDER, AGE

Male, 14

CONDITION

Pectus Carinatum ; Chondrogladiolar Prominence - Symmetrical

INTRODUCTION

Patient Jagger King was diagnosed with Pectus Carinatum (PC) at the age of 13. He presented with an anterior chest wall deformity in which the sternum was observed as an outward protrusion, tilt, or convexity. The prominence was *symmetrical* and *chondrogladiolar*, in which the middle/lower portion of the sternum protruded from the chest wall. The PC affected Jagger’s breathing and caused shortness of breath during physical activities. However, no prior treatment was sought (i.e. no previous bracing, no surgical intervention). He also had no previous conflicting comorbidities that would further interfere with his condition such as Pectus Excavatum or Scoliosis.

At Jagger’s initial evaluation, it was expected that he would require several years in a traditional bracing system to correct his visual prominence. Instead, Jagger and his family opted to try a dynamic bracing method- The Pectus emBrace™.

The Pectus emBrace™ is a custom designed PC orthosis made exclusively by Cureventions. The PC brace is made with a custom molded and assembled thoracic pad with an anterior dynamic force plate that is held together with full circumferential soft materials. It features an exclusive magnetic closure and is unlike any other brace on the market, which are traditionally composed of hard metal and thick plastic. These features make those braces unwearable for extended lengths of time, typically extending the length of treatment further than initially prescribed. The Cureventions’s patent pending design allows full respiration and movement for the patient. Due to the soft thoracic and low-profile design, patients are able to sleep in the orthosis with ease as well. These attributes of the orthosis increase patient compliance and in turn extend corresponding patient wear times. According to Wolff’s Law, extended wearing times while applying a load with a constantly increasing force allows the bone and cartilage to adapt, strengthen, and gradually remodel. This custom designed PC orthosis has a direct dynamic force over the apex of the prominence. The treatment is designed to be continued over an extended period of time to allow proper anterior cartilaginous growth to gradually remodel the rib cage into a more normal, flattened shape. The PC orthosis is to be worn until skeletal maturity is reached.

TREATMENT PLAN

Dr. Jae-O Bae, MD from Phoenix Children’s Hospital referred Jagger to Pongratz Orthotics & Prosthetics in December of 2016 for an evaluation and assessment for a Pectus Carinatum Treatment. Joseph S. Pongratz - Certified Prosthetist and Orthotist, fitted Jagger for a Pectus emBrace™ orthosis and instructed that he follow the published Cureventions’s wearing schedule for 6-8 weeks consecutively:



Left: Toni Bracken, Mother
Right: Jagger King, Case Study (081617) Subject.

Courtesy of Pongratz Orthotics & Prosthetics

“It’s been a real positive experience”

-Toni Bracken

Case Study 081617

Day	Time On (hrs)	Time Off (hrs)
1-3	1-3	2
3-5	3-5	2
5-7	5-7	2
7+	20-22	2

Property of Cureventions

According to Cureventions, this schedule is designed to ease patients into the bracing routine while alleviating the pressure during the initial week of treatment. The recommended 20 hours a day after the first week in the orthosis is designed to maximize contact and overall compression of the pectus prominence. This method was chosen to steadily accustom patients to the brace and maximize initial comfort. The more hours the brace is worn, the higher its effectiveness and success rate in regard to treatment time. Jagger maintained a time log of his wearing schedule to monitor the hours the bracing system was worn. Notes were kept alongside the time log to track any other notable feedback pertaining to the brace.

Jagger’s daily wearing times progressively increased from approximately three hours per day in his first month of treatment to 22 hours per day in his last month of treatment, as shown in *Figure 1 (below)*.



Figure 1 : Patient Jagger King’s average daily log for wearing the Pectus emBrace™ per month of treatment. Daily hour logs were kept and used to calculate an average hourly wear time per day. From left to right: January (start of treatment), February, March, and April (end of treatment).

Jagger visited Pongratz Orthotics and Prosthetics consistently during the duration of his treatment for follow-up appointments and to ensure proper correction. The patient appointment log is listed below and provides a synopsis of the monthly assessments.

Appointment Date	Appointment Type	Description
12/08/2016	Initial Evaluation	Evaluation and assessment for Pectus Carinatum treatment.
01/17/2016	Delivery/ Definitive Fitting	Fitting and delivery of Pectus Carinatum Brace – The Pectus emBrace™. Instructed to follow Cureventions’s published Wearing Schedule – see <i>Figure 1</i> .
02/07/2017	Follow-Up	Follow up PC Orthosis. Patient reported having success with the brace and is now comfortable wearing the device for 4-6 hours per day. Wearing schedule was discussed and increased to target 18-20 hours per day.
03/09/2017	Follow-Up	Follow up PC Orthosis. Patient reported having success with the brace and is now comfortable wearing the device. Wearing schedule was discussed to target 20+ hours per day.
05/04/2017	Follow-Up	Follow up PC Orthosis. Patient reported comfortable wearing the device full time with great success. Patient had a follow up with Dr. Bae to discuss the success; concluded treatment and instructed patient to wear brace at night only as a retainer.
08/08/2017	Follow-Up	Follow up PC Orthosis. Patient wearing the emBrace in a retainer style schedule every other night.

A completion evaluation took place in May of 2017 in which Dr. Bae and Pongratz cleared Jagger and concluded that he had completed the required treatment as per visual observations (significant improvement of the Pectus Carinatum deformity). To prevent over-correction but also inhibit any reversal in progress, he was instructed to wear the brace every other night as a retainer.

EXPERIENCE WITH THE PECTUS EMBRACE™

Jagger wore the Pectus emBrace™ for four months, spanning from January 2017 until April 2017, in which his Pectus Carinatum treatment was completed. He wore the brace approximately 21 hours per day upon adjusting to the routine wearing schedule. In an interview conducted by Pongratz Orthotics & Prosthetics in May of 2017, Jagger expressed how he was happy with his overall treatment and that the brace was comfortable and easy for him to sleep in at night. He also said that it never interfered with things such as his breathing or participating in various outdoor activities. In addition to Jagger's positive feedback, Jagger's mother- Toni Bracken - had a few remarks regarding Jagger's treatment with the Pectus emBrace™ - "It corrected a lot sooner than we had even anticipated. He was able to go to school and continue to do his physical activities with something less intrusive than the other things shown to us on the market. Overall, we're very happy with the experience."

OVERVIEW

Jagger's Pectus Carinatum was treated and corrected in four months with a continuous treatment plan and a wearing schedule that exceeded 21 hours per day. Instead of spending years in a traditional bracing system and struggling with restricting mechanisms such as harsh metals and bulky designs, Jagger's treatment was administered using the Pectus emBrace™ orthosis. This approach not only granted him the confidence of proper skeletal structure and a visually flattened pectus prominence, but also allowed him to continue leading a normal life while undergoing the treatment. Due to its overall patient compliance and underlying dynamic technology, the orthosis was able to be worn extensively resulting in an accelerated treatment time which surpassed the initial prognosis. Jagger now only wears the Pectus emBrace™ every other night as a retainer until skeletal maturity has been reached.