Non-Surgical Option For Sunken Chest Syndrome

Surgeons at Children's Hospital of The King's Daughters in Norfolk, Virginia have fitted a patient with a device that might eliminate the need for surgery in those with one of the world's most common chest deformities, pectus excavatum, often called sunken chest syndrome. Known as the vacuum bell, it works much like devices in body shops that use sustained vacuum to pop out a dent.

"Years from now, we may look at the surgeries and realize that many of these conditions could have been corrected with vacuum devices," said Dr. Robert J. Obermeyer, who is leading the project at CHKD, the nation's top research center for chest-wall deformities and a training site for surgeons from around the world. Pectus excavatum is the most common congenital deformity of the chest wall. Caused by an overgrowth of cartilage in the ribs and sternum, its defining feature is a depression, or indentation, in the middle of the chest.

Until the 1980s, the only correction was a radical surgery that involved removing cartilage and ribs. In the late 1980s, Dr. Donald Nuss, a CHKD pediatric surgeon, developed a minimally invasive technique that involved placing a concave bar into the chest then flipping it over so that it pushes the depression of the chest upward. The Nuss Procedure has since become the surgical gold standard. Today, CHKD performs more pectus excavatum surgeries than any facility in the United States and remains a major training site for surgeons and a center for research on chest wall deformities.

However, even the minimally invasive surgery results in an average hospital stay of five days. Pectus specialists have been exploring less invasive techniques; research is being conducted in San Francisco on implanting magnets in the chest wall that are attracted to a chest brace.

The vacuum bell procedure marks the first use by pectus specialists of a non-surgical device. "CHKD has always made efforts to minimize surgical intervention and I believe this could eliminate the need for surgery in some pectus excavatum patients," said Dr. Obermeyer, who has been instrumental in bringing the technology to the U.S. The vacuum bell device looks something like a large, silicone doughnut, with a bulb attached to remove air pressure. It must be fitted to each patient and fit snugly on the chest. The bulb is used to create a vacuum inside the device.

The vacuum bell must be used about an hour a day and slowly pulls up the depressed area of cartilage. After three to six months of use, the depression in the chest reaches close to the maximum correction. The patient must continue to use the vacuum bell for about two years to make the correction permanent, similar to wearing a retainer after one's teeth are straightened.

In Europe, the concept of a vacuum device to correct sunken chest syndrome has

been discussed for decades, but technology lagged behind. German engineer Eckart Klobe, who suffered pectus excavatum, developed hundreds of prototypes before developing a device that worked reliably. The vacuum bell has been used in Europe for several years, and research suggests that the correction might be permanent. Dr. Obermeyer visited pectus specialists in Switzerland who used the vacuum bell, met with Klobe, toured the production facility where the devices are manufactured and helped expedite its categorization by the Food and Drug Administration as a class 1 medical device, which allows for sale and use in the United States.

While the vacuum bell is non-surgical, it should be used under the supervision of a pectus excavatum specialist because underlying cardiac conditions can make the device dangerous, Dr. Obermeyer cautioned.