BENNETT, COLEMAN & CO. LTD. | ESTABLISHED 1838 | TIMESOFINDIA.COM | EPAPER.TIMESOFINDIA.COM PUNE | WEDNESDAY, JUNE 20, 2012 | PAGES 34 | PRICE ₹ 3

THE TIMES OF INDIA

INCLUSIVE OF ASCENT AND PUNE TIMES

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CARTILAGE GRAFTED FROM THE KNEE WAS SENT FOR CELL CULTURE AND IMPLANTED IN THE PATIENT'S SHOULDER

CELL THERAPY CAN AVERT SHOULDER REPLACEMENT

Umesh Isalkar | TNN

Pune: Badminton player Kunal Ajit Bhide began to suffer from excruciating pain and stiffness in the right shoulder when he was 17 after a fall off the motorcycle.

Desperate not to lose out, he underwent surgery to repair sustained superior labrum anterior posterior (Slap) tear of his right shoulder. It healed, but the screw used for the repair remained prominent within the joint.

Having tried all medical treatments for two and half years, Kunal turned to doctors who would 'grow' a new shoulder cartilage for him with the help of cell-based technology, grown from his cartilage cells.

"The treatment called as autologous chondrocyte implantation (ACI) is used extensively for knee joints. It had not been used for the shoulder joint in India or even South Asia. Special instrumentation was prepared for this surgery, as the shoulder is a complex anatomical joint making it difficult to approach the cartilage and implant the cultured cartilage cells (chondrocytes)," said consultant shoulder and joint replacement surgeon Ashish Babhulkar who operated on Kunal at Deenanath Mangeshkar Hospital on June 14

"After his fall, Kunal underwent arthroscopy and metal screws were implanted to fix the tear," said his father Ajit Bhide, a painting contractor from Karvenagar. Kunal, a promising national badminton player, is a product of Prakash Padukone Badminton Academy, Pune.

But the implant surgery did not help him much. "When there were overhead hand movements, the protruding screws created progressive cartilage loss in the ball and socket joint of the shoulder that allows the arm to rotate in a circular fashion," said Babhulkar.

Three years after the first surgery, Kunal was left with a cartilage void (wear) of almost 500 sq mm. "This cartilage defect caused pain and stiffness due to which Kunal had to give up badminton," his father said.

When Kunal met Babhulkar a year and half ago, he could not lift his hand beyond 90 degrees. Initially, he was placed on shoulder rehab programme for three months. After a year's follow up his shoulder X-rays showed that his cartilage loss was beyond tolerance level.

WHAT IS ACI ?

The idea of an ACI procedure is to take a few cartilage cells from the knee, grow them in the lab, and once millions of cells have been grown they are implanted into the area of cartilage damage

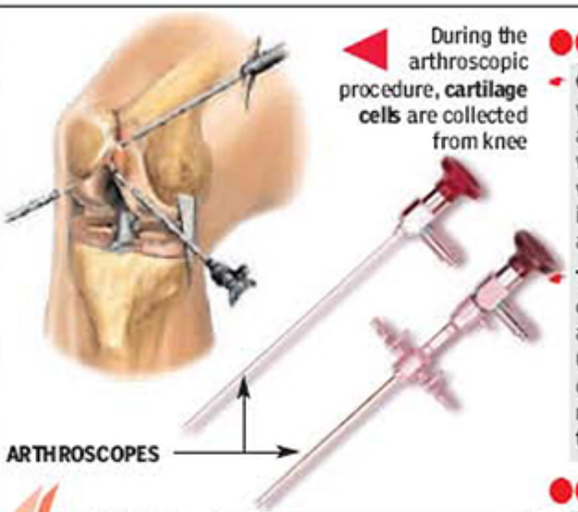
A TWO-STEP PROCEDURE

STEP ONE: ARTHROSCOPY

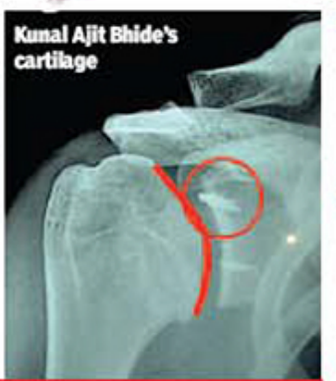
The first step of ACI is to perform an arthroscopic surgery to identify the area of cartilage damage, and determine if it is appropriate for an ACI procedure. During the arthroscopic procedure, cartilage cells are collected. These cells are sent to a cell expansion laboratory where they are multiplied by growing in a culture. Growing enough cells takes about 4-6 weeks. Once enough cells have been grown, they are sent to the surgeon, and the second surgery is scheduled.

STEP TWO: IMPLANTATION

Once sufficient cartilage cells have been grown, a second surgery is scheduled. The cultured cells are implanted into the defective site during this surgery



During the arthroscopic procedure, **cartilage cells** are collected from knee



We had to provide him cartilage cover at the head of the humerus (upper arm bone). We had to opt for a graft harvest from his normal knee and send it for cell culture to Lonavla-based cartilage regenerative laboratory

Ashish Babhulkar | SHOULDER AND JOINT REPLACEMENT SURGEON

"The only solution was to provide him cartilage cover at the head of the humerus (upper arm bone). Due to large requirement of cartilage graft area we had to opt for a graft harvest from his normal knee and send it for cell culture to Lonavla-based cartilage regenerative laboratory," Babhulkar said.

ACI, a two-step minimally invasive procedure ensures natural and permanent repair, forming new hyaline like cartilage. "We undertook a biopsy, a small piece of healthy cartilage tissue was harvested and sent to the Cell Processing Centre in Lonavla for chondrocyte culture for four weeks. These cultured cells were implanted back into the defect site. The implantation has been successful and in six to eight weeks of post-operative rehabilitation, Kunal should regain his full range of motion and function," Babhulkar said.

With cell culturing in India, regenerative medical techniques like ACI are now within the reach of the middle class. "People can seriously reconsider temporary treatments. An almost new joint is much better than an old temporarily repaired one," said Satyen Sanghvi, chief scientific officer of RMS.

WHY ACI?

- **Oral medicines available** for cartilage wear are yet unproven and cannot tackle a lesion so large. In the past such lesions were treated by an arthroscopic washout with the hope that repeated inflammation will not occur, but this was a hit and miss treatment.
- **The only option was** by providing a cartilage cover to the large defect. Such a large defect was impossible to cover using cartilage from the knee. The doctor was aware of cartilage regeneration in the lab as a successful treatment for knee cartilage lesions.

THE CHALLENGES

- **The ball of the shoulder joint** is round unlike the flat knee joint. To pour a liquid graft on a round eroded surface was a task. Hence, a Silicone jacket was designed to retain the cell culture to help keep it snug and prevent spillage
- **The other challenge was** the presence of protruding screws. If they were left in place the screws would scrape the fresh cartilage cover. So an arthroscopic removal of the screws was planned with an innovative technique. A special instrument called hollow mill was used to drill around the protruding screws and loosen them
- **This was achieved** minimal invasive arthroscopic procedure. The joint was then opened and the cartilage defect was freshened and the donor cartilage cell culture was pasted over the defect within the silicone jacket
- **After three years,** Kunal finally has a cartilage cover and along with that the hope that he would eventually have a functioning right shoulder