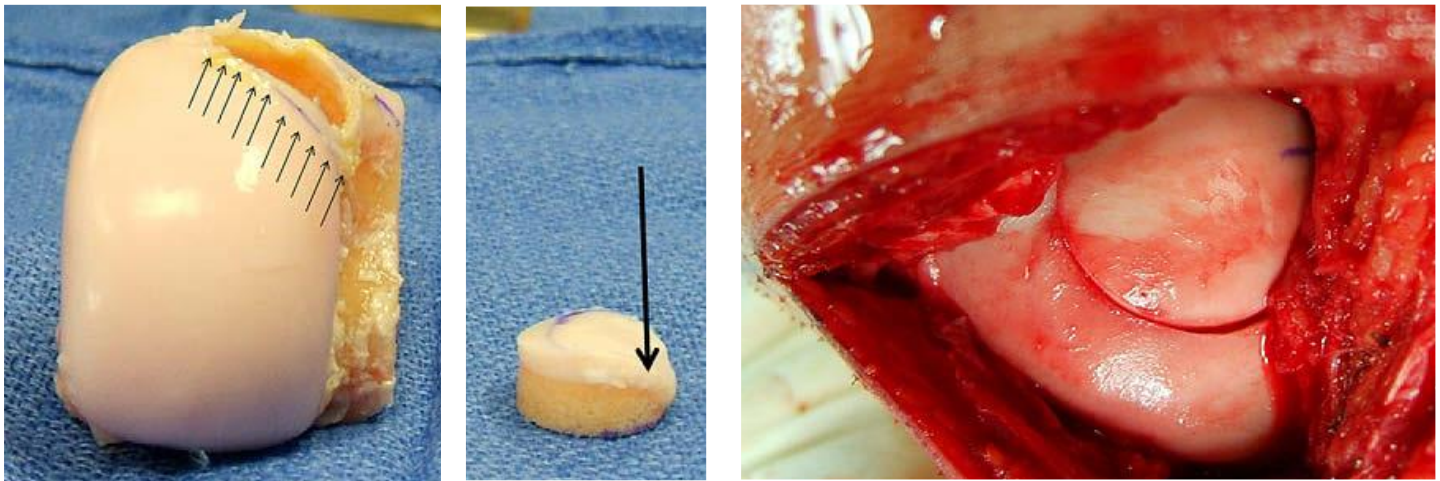


## A Primer on CarboJet® use in fresh Osteochondral Allograft (OCA) transplantation



Images from Lattermann & Romine (2009) Clin Sports Med 28:285-301.

Osteochondral Allograft (OCA) refers to the use of allograft tissue to treat osteochondral (i.e. bone/cartilage) defects. In OCA, pieces of bulk allograft bone/cartilage are harvested from a donor and preserved by a tissue bank. These pieces of bulk allograft are ordered from the tissue bank and made available prior to the OCA procedure. During the OCA procedure, plugs (cylinders or dowels) of bone and overlying cartilage are shaped from the donor allograft tissue on the back table and implanted into the recipient's defect. One of the risks associated with this allograft tissue is rejection because it contains immunogenic factors such as blood, fat, and marrow. Therefore, surgeons generously use pulsed lavage (on the back table) to try and clean out the donor bone tissue (not the cartilage) prior to its implantation. It is well known how ineffective pulsed lavage can be at cleaning blood, fat, and marrow from cancellous bone; and the use of CarboJet to remove fluid and particulate debris from bone surfaces is well documented.

Here is a simple video showing the OCA shaping and implantation technique:

<https://www.youtube.com/watch?v=uQ-eW-1bVz0>

Note that there is similar technique called OATS (Osteochondral Autograft Transfer System, developed by Arthrex®) for treating focal cartilage defects. OATS is often referred to as Mosaicplasty. As traditionally defined, OATS refers to use of autograft tissue from the patient, as opposed to allograft tissue from a donor. Note that sometimes the terms "OATS" and "osteochondral allograft" are used interchangeably, so it is important to make that distinction and recognize that CarboJet can play a role in allograft procedures (OCA) for the reasons described herein.

### Importance of Cleaning Osteochondral Allograft (OCA) Plugs:

- "Cartilage is acellular and immune-privileged. In contrast, subchondral bone is fraught with cells, proteases and other problems that may be associated with graft failure." (05:00 in video linked below)
- "I always pulse lavage the graft with 2-3 liters of antibiotic saline in an effort to rid the graft of marrow elements which may produce the negative effects of immunogenicity." (06:00 in video linked below)

<http://www.arthrex.com/resources/pdv/QlkqB9VMD0CNfwFBPMbXcw/osteochondral-allograft-transplantation>

- "Once the graft has been prepared, pulsatile lavage is used to remove any remaining marrow elements, which are felt to be the most immunogenic part of the graft" (page 170 of paper linked below)

[http://www.pacificaorthopedics.org/downloads/knee/FOAT\\_2006.pdf](http://www.pacificaorthopedics.org/downloads/knee/FOAT_2006.pdf)

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- “In order to decrease the risk of this immune response, bone allograft is processed by multiple techniques (pulsatile irrigation, cold storage, and cytotoxic agents) to remove blood and bone marrow cells, thus creating a less immunogenic transplant.” (page 289 of paper linked below)
- “Before insertion, allografts are subjected to pulsatile lavage to remove blood and bone marrow cells in a final attempt to decrease the risk of a host immune response.” (page 294 of paper linked below)

[https://dl.dropboxusercontent.com/u/31265133/Lattermann\\_2009\\_OCA.pdf](https://dl.dropboxusercontent.com/u/31265133/Lattermann_2009_OCA.pdf)

- “Another important component of the fresh osteochondral allograft is to incorporate PRP and to add it onto the plug...after the plug has been pulsatile lavaged and dried, it acts as a sponge and it absorbs the PRP very nicely.” (04:40 in video linked below)

[http://www.arthrex.com/resources/presentation/BKdSCHGjo0i1fwFHfZUI2A/biocartilage-and-osteochondral-allografts?utm\\_source=WH%252BWNSE%252BSMA&utm\\_medium=EMAIL&utm\\_term=ORTHOBIOLOGICS&utm\\_content=PRES%252BRAFTY%252BMIRZAYAN%252BMD%252BBIOCARTILAGE%252BAND%252BOSTEOCHONDRAL%252BALLOGRAFTS%252BPresentation&utm\\_campaign=WHATS%252BNEW%252B080614](http://www.arthrex.com/resources/presentation/BKdSCHGjo0i1fwFHfZUI2A/biocartilage-and-osteochondral-allografts?utm_source=WH%252BWNSE%252BSMA&utm_medium=EMAIL&utm_term=ORTHOBIOLOGICS&utm_content=PRES%252BRAFTY%252BMIRZAYAN%252BMD%252BBIOCARTILAGE%252BAND%252BOSTEOCHONDRAL%252BALLOGRAFTS%252BPresentation&utm_campaign=WHATS%252BNEW%252B080614)

### Use of CarboJet to clean the OCA plug:

For osteochondral allograft (OCA) procedures, CarboJet (with 40° nozzle) is used on the back table. Remember that CarboJet is used to clean the graft while, or after, pulsed lavage is used. Be sure to direct the CO<sub>2</sub> to the bony part of the graft, but not its cartilage, and capture the spray.

The following two videos show CarboJet in use during OCA:

<https://youtu.be/4cV4MCD1dmA> and <https://youtu.be/N-SEdg4A1SE>

**Allograft Before CarboJet:**



**Allograft After CarboJet:**



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