



ACPA

American Cleft Palate
Craniofacial Association

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Bone Graft Surgery

2026 Edition

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What Is an Alveolar Cleft / Maxillary Cleft?

A child born with a cleft lip will often have a cleft in the gumline, or it may continue through the entire upper jaw and into the nose. The U-shaped bone under the gum that supports the teeth is called the alveolus. The alveolus extends to the top of the tooth-bearing section of the upper jaw. The upper jaw is called the maxilla. Instead of having a smooth upper gumline, the child with a cleft may have a gap (or gaps) between and above the teeth. If the cleft gap ends at the level of the teeth, it is known as an alveolar cleft. If the cleft extends all the way to the nose, it is known as a maxillary cleft.

Like a cleft lip, an alveolar or maxillary cleft can occur on one side of the mouth or on both sides. Sometimes, the cleft is easy to see. Other times, it can be found only with a finger, an X-ray, or a computed tomography (CT) scan.

The cleft care team will examine your child's mouth, gums, and teeth and will decide when additional X-rays or treatments are necessary. X-rays may include dental X-rays, panoramic X-rays, or a computed tomography scan.

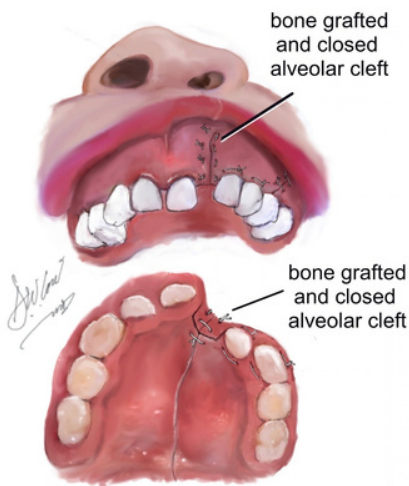


Figure 1

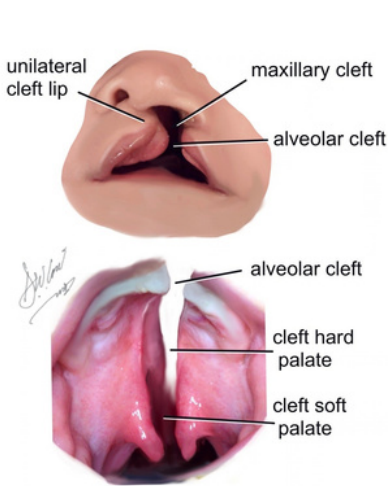


Figure 2

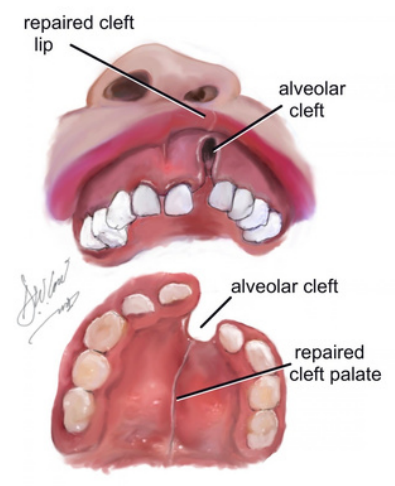


Figure 3

Bone Graft Surgery

BENEFITS OF ALVEOLAR CLEFT SURGERY

Alveolar bone grafting, also called maxillary cleft grafting, offers several benefits.

Bone graft surgery patches the hole in the upper jaw and closes the space between the gums. In this procedure, a surgeon uses a small amount of healthy bone to fill the cleft space. This creates a stable maxilla (upper jaw), which gives the teeth a place to grow. Without a strong upper jaw, several things could happen:

- The adult incisor and canine teeth could fall out.
- The healthy teeth around the cleft area could become crowded and crooked.
- The gums could get irritated.
- Orthodontic braces may not be effective.

Bone graft surgery closes the hole in the gumline. This will stop liquids, such as drinks or some foods, from leaking through the cleft in the gumline and coming out of the nose. It will also prevent food from getting caught in that space.

Bone graft surgery increases bone support in the nose, which can make it look more symmetrical.

The timing of bone graft surgery depends in part on tooth growth, treatment needs, general health, maturity, and mental health. The surgeon and orthodontist on your child's cleft care team will work together to decide the right time for this surgery.

Teeth need healthy bone as an anchor. The upper jaw incisor and canine teeth are located in the front of the mouth, close to the site of the alveolar cleft (on one or both sides). The most common time to do bone graft surgery is when your child is between the ages of 6 and 9 years, when adult teeth are forming but have not yet erupted (have not yet come in). Once the incisor and canine teeth erupt, they will need strong, healthy bone as an anchor to support the roots of the permanent teeth.

Maxillary Expansion

People born with an alveolar or maxillary cleft often have an incorrectly shaped upper jaw because of the cleft. Orthodontic treatment moves the upper jaw teeth into a proper U-shape. If the upper jaw is too narrow, or there is a lot of dental crowding, the orthodontist may prefer to use a device to widen the upper jaw through a process called maxillary expansion. If teeth are present in the cleft site, they may be extracted before surgery. ACPA Approved Teams require the orthodontist and surgeon to communicate directly regarding treatment.

Some children undergo maxillary expansion before bone graft surgery; others undergo bone graft surgery first. Timing depends on your child's age, tooth growth, and the preference of the team's surgeon or orthodontist. In most cases, maxillary expansion lasts 6 to 12 months. A second phase of orthodontic treatment is usually needed afterward, with braces placed once all of your child's permanent teeth have erupted. Orthodontic treatment must take place before surgery and, in most cases, requires several visits. Your child may also undergo minor surgical procedures to prepare for bone graft surgery.

The bone that fills an alveolar or maxillary cleft can come from one of several places:

- Bone from your child's own body is called autogenous bone. This bone usually comes from the hip, shin, lower jaw, top of the skull, or ribs.
- Bone from outside the body is called substitute bone. Substitute bone may come from a human cadaver (allograft), an animal (such as a pig), or may be artificial (synthetic bone).

AUTOGENOUS BONE (FROM THE CHILD'S BODY)

Hip

The hip is the most common bone source for alveolar or maxillary cleft surgery. It is considered the most desirable graft because it has been well researched and has the highest success rate. The donor site, located at the top, outer edge of the hip, is called the iliac crest (also called the wing of the pelvis). The iliac crest bone is plentiful and works well for grafting. To harvest the bone (to remove it), the surgeon makes a 1-inch incision near the child's waistline. Most children can stand or walk gently a few hours after surgery. Two weeks later, the skin incision is usually healed. By then, most children can walk without difficulty.

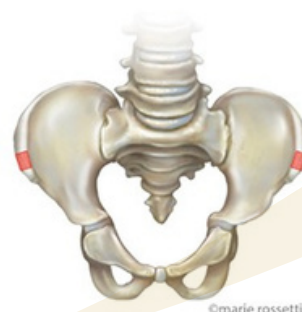


Figure 4: Iliac crest donor site

Shin

A surgeon may close an alveolar cleft with bone taken from a child's shin (the tibia). Tibial bone grafting can be useful, but using this bone carries the risk of problems with the growth plate (also called an epiphyseal plate), cartilage near the end of a long bone that allows it to lengthen as a child grows. However, some studies show good results and no growth problems.



Figure 5: Shin donor site

Jaw

A surgeon may decide to use bone from the lower jaw (the mandible) to fill an alveolar cleft. A mandibular bone graft comes from the bone near the front of the chin, just below the bottom teeth. To remove this bone, a surgeon makes an incision inside the mouth. This method works best when the alveolar cleft is small and only a small amount of bone is needed. The risks include damage to the teeth and numbness of the lip, chin, and gums. But this is a safe method for harvesting bone, with few complications.



Figure 6: Splint stabilizing the upper jaw

Skull

On occasion, a surgeon may recommend using bone from the child's skull (a calvarial graft). Skull bone comes from the outer surface of the head, either from the back of the head or near an ear. This site is used less often but can be a good option in certain cases.

Preparing for Surgery

KEEP YOUR CHILD'S TEETH AND GUMS HEALTHY

In the weeks and months before bone graft surgery, a child must brush and floss thoroughly to keep the teeth and mouth clean. Because of the maxillary cleft, they are at higher risk for certain dental health problems. For example, if the child has crowded teeth, bacteria can build up. Or airflow from a cleft can dry out the mouth and invite bacteria.

Gum health can affect the success of bone graft surgery. During surgery, a surgeon will close the gum tissue over the bone graft. Healthy gums are easy to sew. They improve blood flow to the new bone and support healing. When the gums are inflamed and unhealthy, they can become infected and break down. They can even cause a child to lose some or all of the bone graft.

MEET WITH YOUR CHILD'S PRIMARY-CARE PHYSICIAN

Before your child has surgery, the surgeon may recommend meeting with their primary-care physician. The physician will do these things:

- Verify that your child is generally healthy
- Help you plan for any special health needs and confirm that your child's weight and growth are adequate for surgery
- Make sure that your child's immunizations are up to date

Your child may have a preoperative visit at the hospital or a telephone screening call. During this visit, a staff member will give you instructions on what time to arrive at the hospital on the day of surgery and when your child should stop eating and drinking on that day.

Your child may also have at least one other visit to the surgeon's office for blood tests and other laboratory tests. The surgeon will explain the planned surgical technique and may examine your child. You may also meet with an anesthesiologist, either before surgery or on the morning of surgery, who will examine your child and discuss a plan for managing pain.

PACK FOR THE HOSPITAL

Make sure that you gather these items to take with you to the hospital:

- Health insurance cards
- Identification (driver's license or passport)
- Notebook or electronic device for taking notes
- Comfort items for your child (such as a blanket or special toy)
- Comfort items for yourself (such as a blanket and snacks)

What to Expect on the Day of Surgery

DURING SURGERY

Maxillary cleft surgery is done in the operating room while the child is completely asleep (general anesthesia). The surgery takes a few hours.

- The surgeon will use a small amount of healthy bone to patch the space made by the cleft. Sometimes, this bone is borrowed from somewhere else in the child's body. In these cases, the surgeon's first task is to remove a small amount of bone from the donor site. See the section "Autogenous Bone (from the Child's Body)" in this publication for details.
- Then the surgeon operates on the maxillary cleft. To start, the surgeon separates the skin at the bottom of the nostril from the gums. The surgeon then revises the nostril skin and places the new bone material (sometimes referred to simply as the bone graft) into the space left by the cleft.
- As the last step, the surgeon closes the gums with absorbable sutures (stitches). Unlike traditional sutures that must be removed manually, absorbable stitches are designed to degrade and be absorbed by the body over time. They are made from biodegradable materials such as polyglycolic acid (PGA), polylactic acid (PLA), or polydioxanone (PDO). On average, dissolvable stitches may take one to eight weeks to dissolve completely. However, the exact timeline can vary based on the factors mentioned above.

IMMEDIATELY AFTER SURGERY

Anesthesia and surgery may cause side effects, including sore throat, nausea or vomiting, discomfort, swelling of the face and gums, bruising, difficulty speaking and swallowing, difficulty emptying the bladder or bowels, and constipation. These side effects are usually mild and decrease in the first few days after surgery. Typically, the parent can see the child in the recovery room.

Recovery

HOSPITAL RECOVERY

Most children stay in the hospital for 1-2 nights after surgery. During the first 2 days after surgery, swelling worsens, then slowly improves. Then it usually resolves completely within 3 to 4 weeks. If bone from the hip is used, walking can be painful after surgery and may put a child at risk for falling. Some children need assistance until they can walk on their own.

A child usually needs pain relievers for several days after bone graft surgery. Common medications include anti-inflammatory medications (such as ibuprofen, with the brand names Motrin or Advil) or acetaminophen (brand name: Tylenol). Stronger pain relievers, such as opioids or narcotics (hydrocodone or oxycodone), are usually only needed for the first day while the child is still in the hospital.

AT-HOME RECOVERY

During the first few weeks after surgery, there are a few ways your child can help with healing:

- Sleep on 2 or 3 pillows to keep the head elevated
- Avoid blowing the nose
- Avoid pinching the nose when sneezing
- Avoid strenuous activity
- Maintain good dental hygiene (a dental rinse instead of brushing may be recommended, since brushing can irritate the bone graft site)
- Use nasal and oral rinses as prescribed by your surgeon

HOW DOES A SPLINT HELP WITH HEALING?

After surgery, the jaw needs to stay still so that the new bone will bond with the old bone and form a strong, healthy jaw. A splint will keep the upper jaw from moving. Some children with bilateral maxillary clefts may need to wear a splint after surgery.

Many different types of splints are available. Some look like retainers; some are part of the braces. They usually attach to the upper teeth with wires. Your child may be recommended to wear a splint for a few weeks after surgery. Wearing the splint can make eating and talking difficult. During this time, your child will follow a special diet. See the section “What Can a Patient Eat After Surgery?” in this publication.

A splint can cause plaque to build up on the teeth. Your child’s orthodontist will recommend ways to keep the teeth clean during this time. Sometimes, an orthodontist recommends using a small circular toothbrush, an electric toothbrush, a floss threader, or a special rinse. Patients with tooth decay may need a special fluoride treatment. Those with gum disease (called gingivitis) may need to have extra cleanings from a dentist before surgery and after the splint is removed.

WHAT CAN A PATIENT EAT AFTER SURGERY?

Preventing damage to the surgical site after maxillary cleft surgery is important.

Surgeons have different postoperative instructions. Most will advise starting your child on a liquid diet, then moving to soft, mushy foods over the first week or two. Be sure to talk to your surgery team about those details.

A liquid diet includes only fluids. A juicer or blender can turn most fruits, vegetables, and other foods into liquid shakes. When your child's physician says it is okay to begin eating soft foods, you will still find a blender or food processor useful. Soft food options include mashed potatoes, yogurt, creamed soups, and anything else you can blend. All liquid and soft foods should contain a good balance of carbohydrates, fats, and protein. You can speak with a dietitian, who is a professional who can give families ideas about calories and nutrition.

WHEN WILL MY CHILD RESUME REGULAR ACTIVITIES?

Most children need to be out of school for 1 to 2 weeks after surgery. After that, a child can return to school, usually with limited activity and no gym class. Four to 6 weeks after surgery, most children can resume normal activities. Check with your cleft care team for the specific point when your child can resume physical activities.

While the body heals, a child should avoid strenuous activity such as contact sports, heavy lifting, or swimming. But surgeons do suggest walking and stretching. If your child's procedure included bone removal from the hip or shin, they may feel some pain in those areas. In rare cases, a physiotherapist may suggest that a child use a walker for a period of time.

WAS THIS OPERATION A SUCCESS?

After surgery, the gum tissue over the bone graft should stay closed. When your child's adult teeth come in, they should be well supported by the jawbone and gums. Four to 6 months after surgery, your child's cleft care team may ask that your child undergo radiography. The radiograph (X-ray) will show if the bones have healed well.

Bone graft success rates vary widely, and it's a good question to ask your child's surgeon how successful your child's surgery has been. If the bone graft gets infected, it may shrink or dissolve altogether. If this happens, you will need to talk with your child's cleft care team to discuss options, which might include additional surgery. Sometimes a bone graft can be done again, and sometimes a different approach is used.

Treatments for maxillary clefts can vary from one cleft care team to another. Your child's cleft care or craniofacial surgeon can provide information about your child's situation.



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FOR MORE INFORMATION

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