

PYROCARBON HEMIARTHROPLASTY

The Pyrocarbon Hemiarthroplasty procedure can restore comfort and function to the arthritic shoulder. In this procedure, the arthritic ball (humeral head) is replaced by a smooth pyrocarbon (pyrolytic carbon) ball fixed to the arm bone (humerus) by a stem that fits within it. The native socket (glenoid) is preserved. Pyrocarbon is a special carbon-based material with properties similar to bone and cartilage. It creates less friction and wear against the natural socket surface compared with traditional metal implants, which may reduce pain and the need for future surgery. This procedure is especially well-suited for younger, active patients who wish to avoid a plastic socket replacement.

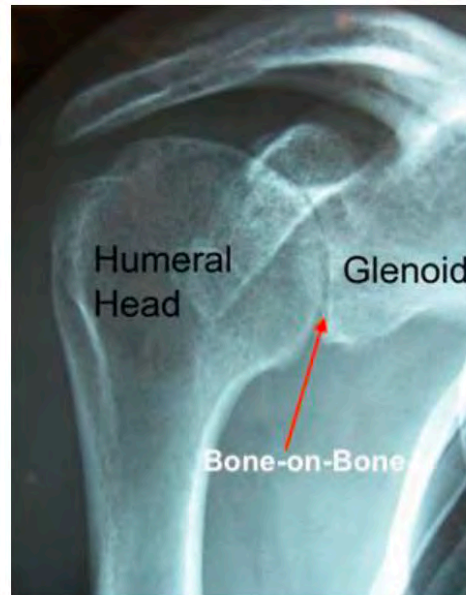


What Is Shoulder Arthritis?

Shoulder arthritis is a condition in which degeneration, injury, inflammation, or previous surgery destroys the normally smooth cartilage on the ball (humeral head) and socket (glenoid). This results in pain, stiffness, and difficulty with everyday activities.

How Is Shoulder Arthritis Diagnosed?

Carefully standardized X-rays reveal the loss of the space between the humeral head and glenoid that is normally occupied by cartilage, leaving bone-on-bone contact. CT scans and MRI studies can be helpful in providing additional information about bone quality, glenoid shape, and the soft tissues surrounding the shoulder joint in preparation for surgery.



How Is a Pyrocarbon Hemiarthroplasty Performed?

After a general or regional anesthetic, this procedure is performed through an incision between the deltoid and the pectoralis major muscles on the front of the shoulder. It includes release of adhesions and contractures and removal of bone spurs that may block range of motion. The arthritic surface of the ball is removed and replaced with a pyrocarbon ball attached to a stem that is press-fit into the inside of the arm bone (humerus), so that only the smooth pyrocarbon surface extends from the bone. In some cases, the bone of the socket may be gently reshaped (reamed) to create a smooth, even surface. The natural socket is preserved — no plastic component is implanted.

What Is Pyrocarbon and Why Is It Used?

Pyrocarbon (pyrolytic carbon) is a material that has been used in medical implants for decades, including heart valves and small joint replacements. Its key advantages include:

- It has a stiffness (elasticity) similar to bone, which may reduce stress on the surrounding bone and socket.
- Laboratory studies show it produces significantly less wear against cartilage and bone compared with traditional cobalt-chromium metal heads.
- It may promote the formation of a protective biological layer (neo-membrane) on the socket surface over time.

Who Should Consider a Pyrocarbon Hemiarthroplasty?

Surgery for shoulder arthritis should only be considered when the arthritis is limiting the quality of the patient's life and after a trial of physical therapy and mild pain medications to determine if non-operative management is sufficiently helpful. Pyrocarbon hemiarthroplasty is particularly considered for:

- Younger patients (generally under age 60) with an active lifestyle
- Patients who wish to avoid the risks of a plastic socket component loosening over time
- Patients with shoulder arthritis or osteonecrosis (loss of blood supply to the bone) of the humeral head

The ideal patient is healthy, active, and committed to the rehabilitation process.

What Results Can Be Expected?

The vast majority of patients experience significant improvement in pain, range of motion, and shoulder function. Research has demonstrated:

- Over 90% of working patients return to work, and over 88% of athletes return to sport.
- Pyrocarbon implants have shown lower revision rates compared with traditional metal hemiarthroplasty implants.

Recovery is progressive — the shoulder often continues to improve for up to two years after surgery.

What Is the Rehabilitation Process After Surgery?

Arthritic shoulders are stiff. Although a major goal of the surgery is to relieve this stiffness by release of scar tissue, it may recur during the recovery process. In order for proper healing to occur, the patient must attain and maintain the 150 degree range of forward elevation achieved at surgery. Achieving this range of motion within the first few days of the procedure is critical to the success of this procedure. For the first 6 weeks of the recovery phase, the focus of rehabilitation is on maintaining this range of flexion. We avoid stretching in other directions so as to avoid disrupting the healing of the subscapularis tendon (see below). Thirty to sixty minutes of aerobic exercise a day (stair climber, treadmill, brisk walking, stationary bike, etc.) has proven a very helpful part of the recovery process.

Strengthening exercises are avoided during the first 6 weeks so as not to stress the subscapularis tendon repair before it heals back to the bone (see below). Later on, once the shoulder is comfortable and flexible, strengthening exercises and additional activities are started. Some patients prefer to carry out the rehabilitation program themselves. Others prefer to work with a physical therapist who understands the total shoulder rehabilitation process.

What Activities Are Permissible After Full Recovery?

Once the shoulder has achieved a comfortable, functional range of motion and adequate strength, most patients are able to return to their desired activities, including work and recreational sports. Your surgeon will guide you on any specific activity modifications based on your individual recovery.

What Problems Can Complicate a Pyrocarbon Hemiarthroplasty and How Can They Be Avoided?

Like all surgeries, pyrocarbon hemiarthroplasty can be complicated by infection, nerve or blood vessel injury, fracture, instability, and anesthetic complications. Specific considerations include:

- Glenoid erosion: Over time, some wearing of the natural socket bone may occur. Studies show this is generally mild with pyrocarbon and less than with traditional metal implants. Proper sizing of the implant is critical to minimizing this risk.
- Implant fracture: In rare cases, the pyrocarbon head may fracture and require replacement.
- Subscapularis tendon injury: Forceful external rotation or pushing/pulling in the first 6 weeks can disrupt the healing of this important tendon. Follow your surgeon's precautions carefully.
- Stiffness: Failure to complete the rehabilitation exercises is the most common cause of a poor outcome. Commitment to the exercise program is essential.

If the shoulder does not achieve satisfactory results, conversion to a total shoulder replacement or reverse shoulder replacement remains an option.