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DR. TOWER'S RECOMMENDATIONS FOR HIS PATIENTS REQUIRING JOINT REPLACEMENT

HIP REPLACEMENTS

Based on experience with articular surface wear and corrosion of metal-on-metal hips and corrosion of modular chrome-cobalt femoral heads, necks, and acetabular liners of Metal-on-Plastic and Ceramic-on-Plastic hips ***Dr. Tower does not recommend use of any chrome-cobalt hip part***, given that may proven, safe alternatives exist (titanium alloy, ceramic, stainless steel, and plastic polyethylene).

The metal ball of metal-on-plastic hip replacement is usually chrome-cobalt, which can corrode at its junction with the femoral stem with the ball. Some cemented hips use a stainless steel ball and stem, this is a safe combination (stainless steel is cobalt-free) and is very well proven to give a durable result.

Some hip socket systems called modular dual mobility (otherwise known as MDM) use a modular chrome-cobalt liner that articulates with a large plastic head, which articulates with either a ceramic ball or a chrome-cobalt ball. Some of Dr. Tower's patients have required revision surgery of MDM sockets for cobalt-related hip and systemic complications, so Dr. Tower does not recommend MDM sockets for either first-time (primary) or revision hip surgeries.

When Dr. Tower does revision hip replacement for a patient who has a cobalt problem at the hip or systemically, he removes all chrome-cobalt parts, if reasonably technically possible. Then, if reasonably technically possible, he does not place any new chrome-cobalt parts.

For primary hip replacement, Dr. Tower most commonly uses a cemented, cobalt-free stainless steel stem with either a cobalt-free stainless steel head or a ceramic head articulating on a cross-linked polyethylene socket. For revision surgery, he most commonly uses a what is called a monoblock titanium alloy stem with a ceramic head articulating on a cross-linked polyethylene socket.

Dr. Tower does 95% of his primary and revision hip operations through either a limited or extensile posterior lateral approach.

SHOULDER REPLACEMENTS

Dr. Tower has had 5 patients with elevated cobalt levels and neurologic problems (which are otherwise known as arthroplastic cobalt encephalopathy) from wear or corrosion of modular chrome-cobalt shoulder components. Therefore, Dr. Tower no longer uses any chrome-cobalt shoulder components. Several companies offer what they term as “cobalt-free” shoulder systems for both types of shoulder replacements, which are termed either anatomic or reverse shoulder replacements.

Dr. Tower performs the anatomic shoulder replacement for 80% of his shoulder replacements. He only resorts to a reverse shoulder replacement if the patient has a severe rotator cuff deficiency.

KNEE REPLACEMENTS

Dr. Tower has yet to identify a patient with elevated cobalt levels exclusively from a knee replacement. Knee replacements most commonly use a chrome-cobalt femoral component which articulates on a plastic tibial component. These are unlikely to generate significant systemically circulated cobalt because of the softer articulating countersurface and the lack of a taper junction.

For the exceptional patient that is hypersensitive to nickel or cobalt there are implants that are termed cobalt-free, but there is insufficient evidence at this time (in Dr. Tower’s opinion) to recommend that this option be routinely employed for all patients.

Urine Cobalt Screening Program for Patients with Chrome-Cobalt Hip or Shoulder Components

Dr. Tower’s practice is to screen patients with chrome-cobalt hip or shoulder components with an annual urine cobalt concentration (U[Co]). Dr. Tower prefers that Quest Labs do the testing because Quest will report both U[Co] and blood cobalt concentration (B[Co]) down to a level of 0.2 parts per billion (ppb). Most people without a chrome-cobalt prosthetic hip or shoulder component have a U[Co] and a B[Co] level of <0.2 ppb; 90-95% of people without a chrome-cobalt prosthetic hip or shoulder part have a U[Co] <1 ppb and a B[Co] less than 0.4 ppb, so these values are Dr. Tower’s threshold for concern. **Patients should abstain from any supplements that contain cobalt for a month before testing (mineral supplements with cobalt on the label or vitamin B-12 injections; most daily multivitamin supplements do not contain enough cobalt to elevate blood or urine cobalt levels).**

If a patient has a U[Co] ≥ 1 , Dr. Tower recommends a B[Co] be obtained. Dr. Tower considers patients with U[Co] ≥ 1 or B[Co] ≥ 0.4 ppb to be cobalt positive. Dr. Tower questions these patients about the development of 12 possible symptoms of arthroplastic cobalt encephalopathy (ACE). A symptom is only scored if it developed or has significantly progressed since the time of implantation of the chrome-cobalt hip or shoulder part and if the symptoms are beyond the patient’s expectations for normal aging. These symptoms are:

1. Fatigue or Exercise Intolerance.
2. Forgetfulness.
3. Poor thinking (Executive Dysfunction)
4. Imbalance or generalized weakness.

5. Numbness in both hands and both feet.
6. Deafness or tinnitus.
7. Poor vision not correctable with glasses.
8. Unintentional weight loss of greater than 10% of a person's body weight.
9. Tremor or fine motor incoordination.
10. Generalized pain.
11. Disordered mood.
12. Disordered sleep.

Dr. Tower suggests that, for those patients who report ≥ 2 of 12 symptoms (again new or progressive symptoms since the chrome-cobalt joint was placed and beyond the patient's expectations for normal aging) with $U[Co] \geq 1$ ppb or $B[Co] \geq 0.4$ ppb consider getting an FDG PET Brain Scan (FPBS) with an analysis of the data from that study specifically with NeuroQ software.

Dr. Tower's study of more than 160 Alaskan patients implanted with at-risk hip or shoulder replacements with chrome-cobalt parts indicates that patients with this degree of blood or urine cobalt elevation frequently have a pattern of brain hypometabolism consistent with a chronic toxic encephalopathy (CTE). Heavy metals (cobalt is a heavy metal), solvents, carbon monoxide, and chemotherapeutic agents all can cause CTE. CTE is generally at least in part reversible if the toxin is removed. For this reason, Dr. Tower discusses the alternatives, risks, and benefits of revision surgery with those patients with elevated urine or blood cobalt levels, those who have 2 or more symptoms of arthroplasty cobalt encephalopathy (ACE) symptoms, and a FPBS showing a CTE pattern of brain hypometabolism. **If revision surgery is done, if reasonably technically feasible, Dr. Tower recommends that all chrome-cobalt parts be removed and that no new chrome-cobalt parts be placed.**