In this study, researchers from the Gait and Posture Lab at the University of Montreal in Canada compare walking patterns between patients who had a total hip replacement versus a surface replacement arthroplasty. An earlier study by Mont et al comparing these two groups reported a slower walking speed and decreased muscle force in the hip abductor muscle of the hip.

Results for the patients in the previous study were reported for six to 18 months after surgery. The effects of different implants on gait pattern were measured six to eight months after surgery in this study. The authors thought that a tighter time frame might give them a better way to compare these two patient groups.

Hip joint resurfacing was introduced several years ago to help younger patients who are more active and who would likely dislocate or wear out a total hip replacement. Surgeons found a way to replace the surface of the joint without removing the bone and replacing the entire joint. Bone is saved because the femoral head (round ball at the top of the thighbone) isn't cut off. And it isn't necessary to put a long stem down into the canal of the femur since the head isn't replaced.

All of these features of joint resurfacing make it possible for patients to extend the life of their own joint before a full joint replacement is needed. There is also some thought that joint resurfacing may preserve a more normal load transfer during gait (walking). If that is true, gait recovery could be added to the list of advantages for joint resurfacing over total hip replacement.

The researchers repeated many of the study features of the Mont et al group but the shorter time period and closer attention paid to the speed of walking set this study apart. Since speed affects how people walk, this factor is important. Three groups of 10 subjects were compared. One group of 10 received a total hip replacement. The second group of 10 had hip joint resurfacing. And the third group was the control group -- volunteers who were healthy and did not have any hip surgery. All 30 participants were similar in age, height, weight, and body mass index (BMI).

They tried to keep the surgical groups fairly simple in order to make clean comparisons. For example, no one in the surgical groups had any other hip or knee problems that could affect the way they walked. No one was obese, had a neurologic problem of any kind, or had back pain (all of which could also affect how they walked).

X-rays were taken before and after surgery and compared. Special computer software (Imagika) was used to measure various angles, centers of rotation, and differences in leg length between the operated hip and the other (normal) side. A daily rehab program under the supervision of a Physical Therapist helped patients regain motion and strength.

Each patient was evaluated individually and given a program that best suited their needs. Special attention was paid to the muscles surrounding the hip. All exercises were progressed over a period of 12 weeks until the patients could return to normal, unrestricted activities (including high-impact sports such as basketball, football, or hockey).

Their gait or walking pattern was measured using a special walkway that was 10 meters long and had two force platforms to measure pressure as the person put his or her foot down. Special cameras recorded overall motion (movement pattern) and length of each stride. A computer program analyzed the speed of walking and the rhythm. Together these two things are called the cadence. The therapist also used a handheld device called
a myometer to measure abductor muscle strength on both sides. The abductor muscles help stabilize the hip when standing on one leg. The abductor muscles also move the leg away from the body.

Besides X-ray comparisons made before and after surgery, clinical outcomes such as function were compared using a well-known test called the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The results of all the measures taken and analyzed showed that the patients with hip joint resurfacing regained a normal gait pattern faster than the patients getting a total hip replacement. Patients in both groups still had weaker hip abductor muscles compared with the other side.

These findings confirm what other researchers have reported: restoring hip muscle strength after hip replacement is very important. It may be the key factor in gait recovery. That brings us back to the rehab portion of recovery. Several questions arise: is the standard rehab program enough? Do patients need to continue with supervised exercises for a longer period than the usual two-to-three month period of time? Are the exercises they are doing the right ones?

Studies are needed to compare different exercise protocols and find the best one for strengthening hip abductor muscles. But the authors point out that this is only one variable. Other studies have already pointed out that the less invasive nature of hip joint resurfacing still puts this method ahead of a total hip replacement in fostering faster recovery from the surgery. The more surgeons can preserve bone and spare the soft tissues, the better chance the patient has for revision surgery later.

The authors of this study point out that restoring hip biomechanics with careful reconstruction of the hip joint also goes a long way toward restoring normal gait and function. The exact placement of the hip center of rotation is important because it determines how well the abductor muscles can contract to move the leg during gait and other activities.

So for now, it seems that there are many reasons why joint resurfacing has advantages over a total hip replacement for younger, more active adults. In order to maximize these benefits, it will be necessary to continue studying all aspects of the implant design, surgical technique, and rehab protocols. The results of this study move us in the right direction of helping patients regain normal walking patterns including stride length and cadence as quickly as possible.