

Immobility: Not a Great Idea, To Hop Or Not To Hop *and* LegSim

John A. Tata MD



Immobility: Not a Great Idea

There are times in one's life when it is necessary and appropriate to rest and stay immobile, e.g., after major surgery or trauma. There

are other times when the thought of moving can be so overwhelming that staying in bed seems like a good idea. Immobility is not a great idea for anyone for any length of time. It sets into motion a whole set of medical conditions that may have major consequences, among them osteoporosis, obesity, Syndrome X, deep vein thrombosis and pulmonary embolism.

Osteoporosis

Mobility allows the vector forces of gravity to stimulate bones to increase total bone mass. Conversely, immobility results in a decrease in total bone mass. This condition, osteoporosis, increases an individual's risk of fracture; fracture can occur with little or no trauma. Hip and spine fractures are the most common; they cause more immobility which further decreases bone mass. Loss of bone mass occurs slowly in younger individuals whose bones are strong and dense. Older individuals, especially post-menopausal females, can experience dramatic losses. Medications

are available which help increase bone density. However, the best defense is maintaining weight-bearing mobility.

Obesity

It should come as no surprise that immobility is directly related to weight gain with or without limb loss. Researchers in the United Kingdom found that "obesity is a well known complication of amputation but more so in the patient with transfemoral and bilateral amputations."ⁱ Nassar et. al. state that weight was a significant factor in determining the number of repairs in lower limb prosthesis.ⁱⁱ Weight gain often triggers a cascade of other metabolic conditions that may impact an individual's overall well being.

Syndrome X

In 1988 researchers at Stanford University identified a syndrome complex linked to obesity, including abdominal obesity, hypertension, insulin resistance, elevated triglycerides, and low levels of "good" cholesterol (HDL). It is felt to affect as many as two thirds of all Americans, up to 50 million people. Syndrome X is believed to be the precursor of Type 2 diabetes,

John Tata MD, Medical Director, and Joseph Schrader, President of Hartford Walking Systems are committed to providing amputees with improved mobility, independence and security. Contact him at docjat@im-imagingmagic.com

in which insulin becomes less effective in moving glucose into cells. Patients with Syndrome X are at increased risk for arteriosclerotic heart and peripheral vascular disease.ⁱⁱⁱ

Lifestyle changes, largely weight loss and increasing physical activity, are the main interventions in the treatment of Syndrome X. These goals are more challenging for those living with limb loss. Another component of Syndrome X is hypercoagulability.^{iv} The result is deep venous thrombosis (DVT), a potentially fatal condition..

Deep Vein Thrombosis (DVT)

DVT presents with painful swelling and often redness in the calf and lower legs. It can be easily diagnosed using Color Doppler ultrasound. Sound waves are able to “see” blood flowing through normal veins. If a clot is present, the normal flow pattern is disrupted and a filling defect or clot is seen on the images.

Normal Color Doppler Ultrasound

This ultrasound image (Fig. 1) demonstrates a vein (blue) and an artery (red/orange). The color is seen filling the entire structure of both vessels indicating that both artery and vein are free of clot or filling defects.

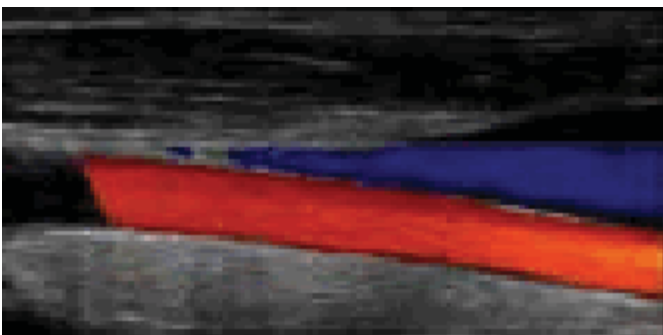


Figure 1
obtained <http://www.wikipedia.com>

Abnormal vessel with a clot

When a clot is present in a vein or artery, it will fill in a portion of the vessel causing the blood to flow around the clot. This will appear as a filling defect on either an ultrasound or CT scan.

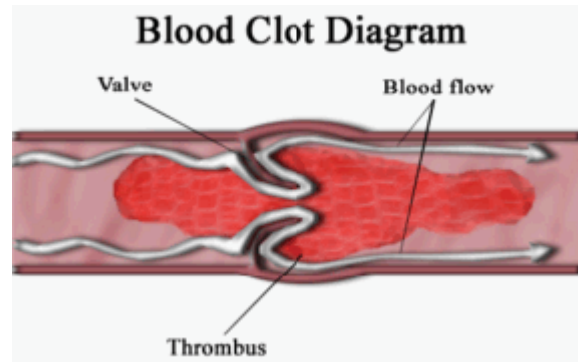


Figure 2 obtained <http://www.wikipedia.com>

Pulmonary embolus (PE)

Once blood clots develop in the lower legs, they may become dislodged and travel through the major veins in the abdomen into the chest. Once in the lungs, the clots block the normal flow of blood through the lungs restricting their ability to oxygenate the blood. The resulting condition, pulmonary embolism, may cause total cardiovascular collapse and oftentimes death. David Bloom, NBC reporter embedded in Iraq with the Armed Forces, died as a result of PE from a lower leg clot.^v This condition, if suspected, can be diagnosed by CT pulmonary angiogram.

CT Pulmonary angiogram

Newer generation CT scanners are able to see the major vessels of the heart and lungs. The image below was obtained after a contrast agent (bright white material) was given to make the blood visible to the scanner. The darker structure outlined by the contrast is a

continued next page

large clot (PE) within the main pulmonary artery.
This is a life threatening emergency.



Figure 3 obtained <http://www.wikipedia.com>

Conclusion

Mobility is a necessity if we are to maintain a healthy lifestyle. Individuals living with limb loss can choose from a variety of options: crutches, walkers, traditional prosthetic device or the LEGSIM. Each device has its own sets of pluses and minuses. The key point to keep in mind is that mobility is an imperative if we are to maintain our independence and overall sense of wellbeing.



“To Hop Or Not To Hop”

Individuals who live with limb loss make many choices each day having to do with their mobility. Do I choose to move today or do I simply stay put? Do I use my walker, wheelchair, crutches, or prosthetic device? Or do I hop on my sound side as my primary mode of mobility?

Unfortunately, many younger individuals choose to hop on their sound side unaware of the potential damage they may be doing to the joints. The reasons are simple: it is fast, easy, seemingly painless. There is no need to get into a wheelchair or take the time to put on prosthetic device. Most think of themselves as invincible. They seldom consider the future consequences to their hip, knee or ankle because of their choice to hop. The potential risks to their sound side joints are real and individuals with limb loss owe it to themselves to learn what they are.

continued next page

KEEP MOVING: SAFELY, COMFORTABLY AND PRUDENTLY

References

- ⁱ Naseer H. J. Haboubi, MBChB, MRCP; Michael Heelis, BSc; Ruth Woodruff, DIPT, MCSP; Imad Al-Khawaja, PhD, MRCP, The effect of body weight and age on frequency of repairs in lower-limb prostheses, *Journal of Rehabilitation Research and Development*, Vol. 38 No. 4, July/August 2001
- ⁱⁱ Ibid. et.al.
- ⁱⁱⁱ American Heart Association at www.americanheart.org. key-words, “metabolic syndrome.” March 8, 2007.
- ^{iv} Ibid.
- ^v ClotCare Online Resource, “David Bloom’s DVT Story: An Interview with Melanie Bloom,” April 8, 2007. www.clotcare.com. Key words DVT obtained April 8, 2007

Why not hop???

Physicians, physical therapists and prosthetists all need to discourage patients from hopping around on one foot. Loss of a limb from amputation affects all the other weight-bearing joints in the body. The force of gravity is redistributed to the joints of the sound side: hip, knee, ankle and pelvis. The effects are more acute when an individual chooses to hop on their sound side. because increased vector forces impact the joints on only one side. The added workload to the sound joints can cause accelerated thinning of the joint cartilage surfaces. The cartilage thinning and resultant bone remodeling cause degenerative arthritis.

We are fortunate today to have a wide variety of options for mobility to avoid hopping. Crutches, walkers, wheelchairs and various prosthetic devices including the LEGSIM all provide useful options. Each device has its own strengths and weaknesses. None is likely to suit all of any given individual's needs. Protecting joints from premature or accelerated cartilage thinning and damage should be a major priority for all individuals. This is especially true for those who live with limb loss.

Conclusion

Individuals living with limb loss can choose to "hop" or use any one of many assist devices to move from point A to point B. The reasons why an individual chooses one over another are personal, and may even change from one day to the next. The most important mandate is to protect joints each day.

HARTFORD WALKING SYSTEMS *LEGSIM*

Clinical Case Study

PW is a 61 year old male who suffered a major stroke 14 years ago because of a blood disorder. He was left with a paralyzed left arm and leg. Two years later he required a left BK amputation because of a blockage in his paralyzed leg.

Case-specific challenges PW was fitted with a traditional prosthetic device with limited success because of pain and discomfort at the stump site. His only secondary option for mobility was a wheelchair as crutches and traditional walkers were not feasible because of his paralysis. The weakness in his left upper extremity and generalized muscle atrophy failed to provide him with the lateral stability needed for prolonged mobility. The stroke impaired his depth perception limiting his ability to feel secure and confident during movement. The traditional LEGSIM

was not an option as PW could not lift the device with one arm.

Case-specific solutions: The LEGSIM was modified, similar to a pendulum, allowing it to move forward and straight. It was rebalanced so that PW was able to lift it with his sound hand. Lateral stabilizers were added to address the problem of lateral stability thereby compensating for his lack of depth perception.

Case-specific results: PW found the modified LEGSIM a major improvement noting he felt "more secure," "less likely to fall," and "generally improved balance." The learning curve was short requiring minimal instruction and training before he felt comfortable. The narrow width of the device allowed him to fit into narrow spaces in his home performing activities of normal daily life i.e. washing dishes. PW felt more confident in knowing he could exit buildings quickly in an emergency situation arose. 