ARJOHUNTLEIGH
GETINGE GROUP

FAQ
DVT

USING IPC IN ORTHOPAEDIC SURGERY

Q. What are the recommendations for use of the *Flowtron* system in Orthopaedic surgery?

Thrombus formation and propagation depend on the presence of abnormalities of blood flow, blood vessel wall and blood clotting components, known collectively as Virchow's triad. Virchow in the mid 1800's was the first person to recognise the 3 factors that cause the development of a thrombosis. Venous stasis occurs when there's a decrease in actual movement of blood, causing venous congestion in the lower extremities; this may occur after prolonged immobility or confinement to bed or chair. Changes in blood chemistry causing hypercoagulability as a result of drug therapy, disease or surgery can also contribute to the development of DVT. Vein injury, the third factor can result from a variety of causes including trauma, surgery and venous distension.

The Flowtron® DVT prophylaxis system, known generically as Intermittent Pneumatic Compression (IPC) is an active form of mechanical prophylaxis and works to mitigate not one but two of the risk factors associated with VTE development: hypercoagulability and venous stasis. Inflatable, single patient use garments are wrapped either around the feet, calf or calf and thigh and are inflated by a pneumatic pump. The pump provides intermittent cycles of compressed air which alternately inflate and deflate the chamber garments, mimicking the natural activity of the calf muscle pump and increasing blood flow velocity in the deep veins thereby reducing stasis and flushing valve pockets where thrombi originate (Kumar and Walker 2002). In 1976, a study was undertaken (Knight and Dawson) illustrating that the application of IPC to the arm resulted in lower incidence of DVT. Since then, various studies have been performed in-vitro, humans and animals demonstrating that the mechanical effects of increasing blood flow also apply a shear strain on the endothelial lining of the vein and artery causing release of biochemical mediators which enhance global (total body) fibrinolysis, platelet disaggregation and vasodilation (Chouhan et al 1999, Chen 2001, Giddings et al 2001, 2004, Morris 2008, NICE 2010).

A. Use of the *Flowtron* System in hip and knee arthroplasty patients

Hip and knee arthroplasty places the patient at particularly high risk of VTE. Without prophylaxis rates between 40-60% are typical (Geerts et al 2008). In a review article on VTE during hip and knee replacement, Sculco et al (2002) discuss the intense activation of the clotting system that occurs intra-operatively as a result of the insertion of the instrumentation into the medullary canal; this is compounded by stasis in the lower extremity due to obstruction of femoral venous flow either while the lower extremity is kept in an extreme condition to provide adequate exposure for preparation of the femur and insertion of the femoral component during hip replacement or as a result of tourniquet use during knee replacement. The kinking of the femoral vein causes endothelial injury, providing the nidus for clot formation and propagation. This highlights the requirement, where possible, for VTE prophylaxis to occur during surgery wherever possible and continue for as long as possible post-operatively until the patient is mobile.

If the surgeon is operating on one limb, the pump can be used on the single leg option on the contra-lateral leg. The anti-thrombotic and fibrinolytic effects of the *Flowtron* system will still be protecting the patient and there is no issue of the garment affecting/ contaminating the operative site. It would be recommended that a *Flowtron* garment is

applied to the operative leg as soon as possible after surgery ideally in the recovery room. Post-operatively it is the surgeon's decision alongside the practicality of applying a calf garment to a heavily bandaged limb as to whether a calf garment is suitable to be used.

A number of studies have been undertaken in joint replacement surgery/ trauma settings where the *Flowtron* system has been successfully used solely on the contra-lateral leg during surgery and then *Flowtron* garments applied immediately post-operatively and then continued for the duration of hospitalisation (Pidala et al 1992, Eskander et al 1997, Stone et al 1996, Richards et al 2001, Ginzburg et al 2003, Brooks et al 2007).

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These FAQ's have been developed to answer common questions which arise during clinical practice and in the market place when clinical evidence is scarce. It is important to consider the holistic care of the patient and use clinical judgement making decisions based on the answers. If you cannot find an answer for which you are looking, please email karen.milton@arjohuntleigh.com with your question(s) and we will endeavour to provide an answer and make it available to help educate others.

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