



# Enhanced External Counterpulsation

A non-surgical therapy for the chronic sufferer

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## **Introduction:**

Nursing in the cardiology setting involves dealing with patients undergoing revascularisation procedures, either elective or emergency, in addition to those attending hospital for the management of various cardiac complaints. Fortunately routine treatment is beneficial in improving quality of life in most cases.

Unfortunately we also have many regular patients who have intractable disease, and who are very difficult, even verging on the impossible to treat. These patients have exhausted nearly all forms of treatment, are on maximum medication and are still experiencing a high level of angina, and a constant limitation in their quality of life. Enhanced External Counterpulsation provides us with the opportunity now to give these chronic sufferers of angina a new hope for a better quality of life and a reduction in their anginal symptoms in the future.

From the nursing perspective this therapy, which lasts for seven

weeks, gives us a great opportunity to explore how the patient is dealing with his/her disease process and gives us the time to discuss ways of improving their quality of life, and give them a more positive outlook with regard to their health.

During treatment sessions the patient has the opportunity to talk about what worries him most regarding his heart disease and also can be encouraged on a regular basis with maintenance if his dietary requirements, his exercise pattern, and perhaps better scheduling of medication. The nurse has the time to listen to the patient, and to give appropriate advice, whilst being there to see the patient carry the advice through to fruition. This can be demonstrated by the fact that patients receiving treatment often lose excess weight due to the fact that the program enables them to commence and maintain a healthy low fat diet over the seven weeks.

The nurse involved in the treatment co-ordination keeps a daily

assessment record and then continuously analyses the data collected and follows up patients at six monthly intervals post EECP.

Patients receiving the treatment to date have related that they feel it has given them a new lease of life, and they often feel that they have got back the quality of life that they have missed over recent years.

## **What is Enhanced External Counterpulsation? (EECP)**

Enhanced External Counterpulsation Therapy is a non-invasive procedure employed to reduce symptoms, and increase quality of life in chronic angina patients. The procedure involves the sequential inflation and deflation of compression cuffs regulated by the synchronised ECG signal from the control console on the machine. During diastole just as the aortic valve closes inflation of the cuffs occur, augmenting diastole and increasing coronary artery perfusion pressure.

With inflation, and the compression

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of vascular beds of the legs there is an increase of venous return to the heart, and thus an increase in cardiac output. Deflation of the cuffs occurs just prior to the onset of systole, reducing systolic pressure, permitting systolic unloading and decreasing cardiac workload.

### History of EECP

The theory of counterpulsation originated from the work of Kantrowitz and Kantrowitz in the 1950s when they first described the principle of “phase shift diastolic augmentation”. Early research in Harvard studied the potential efficacy of counterpulsation as a treatment for patients with low cardiac output. During this period at Harvard, Birtwell and Clauss first produced the intra-aortic balloon pump, using similar experiments but using direct counterpulsation.

The first external counterpulsation devices used hydraulic systems. These were then replaced with pneumatics and the design was modernised and updated to improve results and increase patient comfort. In the 1970s Zheng and other physicians at Sun Yat Sen University in China developed a sequential form of the pulsation system. In conjunction with the Chinese studies in sequential counterpulsation scientists at the State University of New York at Stony Brook, developed an Enhanced External Counterpulsation system. The system is similar to today’s in that it employs a three cuff compression configuration combined with computerised control of the process of inflation and deflation timing.

Studies such as the Multi-centre study of EECP (MUST-EECP) have proved that the treatment is highly beneficial for angina patients even beyond the phase of therapy. The benefits found included:

- ‘Elimination or decrease in exercise induced signs of lack of oxygen to the heart muscle.’
- ‘Increased exercise tolerance.’
- ‘Elimination or decrease in episodes of chest pain.’
- ‘Decrease in need for anti-anginal medication.’

### Goals and Risks of Treatment

The goal of treatment with EECP is to reduce the frequency and intensity of chest pain, or in certain circumstances eliminate the pain altogether. The therapy may lead to a decrease in medication dosages and greatly improve quality of life in the participating patient. There are little risks associated with EECP as it is a non-invasive therapy. Friction from the cuffs during inflation and deflation may cause skin irritation or superficial blistering in a minority of patients. Some back pain or muscular ache may also affect the patient.

### Nursing Implication in EECP

This innovative therapy is new to the European healthcare system but has been used in the US for a number of years with a substantial success rate in alleviating the symp-

toms of angina. From a nursing point of view it is exciting to be able to offer patients who are chronic sufferers of angina a way forward and a chance to increase his or her quality of life. EECP requires a commitment to treatment from the patient as it is a daily procedure taking one hour, five days a week, for seven weeks: a total of thirty-five treatments. This does not seem to be a problem for the patient who feels he or she has no other choices with regard to treatment. Using our small study showed that patients experienced an improvement in their quality of life and increase in exercise tolerance post EECP, and proved that this treatment is a safe therapy for patients with chronic refractory angina. Through the duration of treatment there is a chance as previously stated for the therapist to provide an interactive education programme, giving therapy and discussing the patient’s heart disease, medications and activity schedules. Depression is also a factor related to chronic angina and studies done in this area have revealed that EECP is associated with improvement in depression scores. This may be due to the individualised attention with treatment, together with the improvement in symptoms. Patients appear to gather a confidence with the progression of therapy to the point of being able to increase stride when walking and experience alleviation of anginal symptoms after 15 to 20 hours of treatment. Benefits following treatment have been documented by echocardiology and cardiolyte stress testing. The presumptive benefit is theoretically down to the development of collateral vessels in areas of ischaemia. A three year study undertaken by Lawson et al 1995 at the State University Health Sciences Centre of New York, showed a long term benefit from Enhanced External Counterpulsation in chronic angina pectoris.

### Conclusion

Our experience over the past six months in Beaumont Hospital has been a very positive one indeed with 100% of patients completing therapy. From the outset of the programme our studies have shown that patients experienced an improvement in their quality of life, increased their exercise tolerance, and most significantly reduced their anginal symptoms. My experience with EECP is that the treatment presents little danger to patients and may provide long lasting benefits for those who suffer from debilitating angina. A complete work-up is carried out prior to commencing treatment. EECP is used here for intractable angina patients to alleviate symptoms and to promote the development of collateral circulation. The success of this innovative therapy has served to restore quality of life to angina sufferers here in Ireland. It has offered fresh hope, and a successful outcome for those patients with few if any remaining treatment options.