Factors affecting the quality of life of patients with mechanical heart valve prostheses: a literature review

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SUMMARY

- Valvular heart disease is a common source of cardiac dysfunction and mortality, of which the prevalence increases with age.
- Implantation of a mechanical heart valve prosthesis is an effective treatment for patients with valvular heart disease, which would physically improve the cardiac function and reduce the morbidity and mortality.
- Improving patients' quality of life is one of the ultimate goals of mechanical heart valve prosthesis implantation. Various factors, including the life-long anticoagulant therapy, valve sound, age, gender, and waiting time, have impacts on the quality of life of patients with a mechanical heart valve prosthesis.

INTRODUCTION

Heart disease has been the leading cause of deaths worldwide. Valvular heart disease is a common source of cardiac dysfunction and mortality. The prevalence of valvular heart diseases increases with age due to aging-related calcification in heart valves (Go et al., 2014). With increasing longevity and ageing in the population, the number of patients vulnerable to heart valve diseases is also expected to increase. Apart from medical treatment, valvular surgery (repairing or replacing the diseased valve with a prosthetic one) could prevent the further deterioration of the heart and restore its functions (Nishimura et al., 2014). Surgical treatments for valvular heart diseases include repairing or replacing the diseased valve with a prosthetic one, among which the biological and mechanical valves are the common choices.

The first mechanical heart valve prosthesis (MHVP) was implanted in 1960 (Sun et al., 2009). Since then, the durability and haemodynamic performance of valves have continued to be modified. Due to the freedom from structural degeneration, mechanical heart valves have lower possibility of re-operation than the biological ones (Garcia, 2007). In Hong Kong, valvular surgeries account for 34% of all cardiac surgeries (Prince of Wales Hospital, 2009).

In addition to physically improving the cardiac function and reducing the morbidity and mortality, the ultimate goals of heart valve surgery also include improving patients' quality of life (QoL). As a dynamic concept collecting both subjective and objective perception of well-being, QoL is a crucial indicator in evaluating health outcomes (Goldsmith et al., 2001; Huber et al., 2007; Bowling, 2003), and covers the aspects of physical and social functioning, emotional status, cognitive ability, general perceptions of health, and disease-specific symptoms (Bowling, 2003). Previous studies significance improvements in QoL among patients after the implantation of MHVP (Martin et al. 2008).

Understanding of influencing factors of QoL would help health care professionals to take effective measures to improve the QoL among patients with MHVP. Therefore, this study aims to comprehensively review and summarize the influencing factors of QoL in patients with MHVP.

METHODS

Search strategy

An electronic search in all published English articles in the past 20 years was performed in the following databases: British Nursing Index, CINAHL Plus, EMBASE, and Medline. The keywords of "quality of life," "mechanical heart valve prostheses," "noise or sound," and "anticoagulant therapy" were used. All studies focusing on the QoL after MHVP implantation were included.

RESULTS

Several factors were identified with influences on patients' QoL among the articles, such as the life-long anticoagulant therapy (ACT), rhythmic closing click of the MHVP, age, gender, and waiting time for the surgery. The following part will review each influencing factor respectively.

Anticoagulation therapy

Besides the therapeutic effects on restoring and promoting cardiac functioning, the implantation of a MHVP, an artificial device in contact with the circulating bloodstream, exposes patients to persistent risks of valve thrombus and embolism (Kulik et al., 2006; Garcia, 2007). Anticoagulants could reduce the incidence of thrombo-embolic events to maintain the long-term functioning and durability of MHVP (Emery et al., 2008).

Although ACT may protect the patients from thrombo-embolic events, the risk of bleeding also increases. International normalized ratio (INR) is a standardized indicator for prothrombin time. An INR within normal range reflects the appropriate dosage of ACT (Bernardo, 1997; Niino et al., 2010). ACT has directly and indirectly influence on the QoL among this group of patients. On one hand, the pharmacologic therapeutic range is narrow and varies among individuals. The increased risks of thromboembolic and bleeding,

the main adverse events associated with ACT, are crucial issues affecting the QoL of patients with MHVP (Dauphin et al., 2008). Many patients with MHVP reported their worries about the frequent blood tests and medical visits (Perchinsky et al., 1998).On the other hand, complying with the ACT is not an easy task. Modifications in diet habits, activities, regular medical follow ups, and blood monitoring of INR are most important for patients at the beginning of ACT, especially immediately after surgery and during the recovery period. The frequent medical visits and blood tests, as well as persistent risks for bleeding and thrombo-embolic risks may distress patients physically, psychologically, socially, and financially (Gadisseur et al., 2003), which influence their QoL.

Samsa et al. (2004) invented the first instrument, the Duke Anticoagulation Satisfaction Scale (DASS) to measure patients' QoL and satisfaction with ACT. It was found that dissatisfaction with the ACT lead to poorer QoL. Meanwhile, Casasis et al (2005) investigated the positive and negative perceptions of ACT and its effects on the QoL among patients on long-term anticoagulants by utilizing a self-developed oral anticoagulation therapy-specific instrument. According to Casasis, et al. (2005), perceptions of ACT have a direct relationship with QoL. Negative perceptions which lower patients' QoL were female sex, habit modification, patients with less than one year of treatment, and dissatisfaction with medical attention. Prins et al. (2009) developed a "Perception of Anticoagulant Treatment Questionnaire" to assess patients' needs and their perceptions of ACT. The questionnaire is effective in evaluating anticoagulation treatment before and after intervention. However, the instruments did not correlate the results with patients' QoL.

Mechanical valve sound

Apart from the ACT, the rhythmic closing click of the MHVP would burden patients throughout their lives. The sounds of MHVP are louder than those of normal heart valves, and are audible to both the patients and persons nearby. Patients with MHVP have two to three times higher perceived sound than nearby persons (Johnsen et al., 2000). Especially under the quiet environments and during sleep, patients could perceive amplified MHVP sounds, which significantly affected their QoL. Among the studies on MHVP sound, most focused on the levels of sound caused by different brands of MHVP and the disturbances perceived by patients (Golczyk, et al., 2010). Some studies also analyzed the sound frequency spectrum to evaluate the function of the MHVP (Fritzsche et al., 2007).

Laurens et al. (1992) reported that 14.2% of the patients with single valve and double valve replacement complained that the MHVP sound caused nervousness, fear, irritation, and sleep disturbances. That study also showed the levels of MHVP sound and related disturbances were not associated between either the number of valve replacements or the position of the MHVP. Another study conducted by Limb et al. (1992) found similar findings that annoyance, sleeping disturbances in patients and their partners, interference with concentration, and social embarrassment were the complaints regarding MHVP sound by patients after implantation. Both studies reported that younger patients had more complaints about the disturbances caused by MHVP sound. Furthermore, gender was correlated with the problem that females reported greater annoyance with the MHVP sound than males (Laurens et al., 1992; Limb et al., 1992). Given the uncomfortable situations caused by MHVP sound, 50% of the MHVP patients wished to have a quieter valve (Blome-Eberwein et al., 1996). Another study among patients with MHVP also revealed that a lower level of QoL, which was significantly correlated with a higher level of perceived disturbance (Koertke et al., 2003). The level of disturbance was associated with mitral valve replacement, double valve replacement, gender, and age.

With the advances in technology, newly-developed MHVP may have lower level of valve sound. A recent research reported 92.8% the patients with MHVP are unnoticed about the valve sound (Sezai et al., 2010). However, that study only recruited patients implanted with the ATS valves. Therefore, whether other brands of newly-developed MHVP generate similar levels of sound, and whether their sound has similar impacts on patients' QoL have not been investigated.

Age

Doorn et al (2000) reported an impaired level of QoL among patients aged between 9.7 to 25.4 years old after mitral valve replacement. Due to the ACT, limitations on social activities (such as physical games and other outdoor activities) may affect patients` social life. There has been a debate about whether the valvular surgery is suitable for elderly patients. On one hand, due to age-related calcification in the valves and increasing ageing in the global population, the mean age of patients who need to implant MHVP has increased. On the other hand, the risks of complications after surgery (such as organ failures, bleeding, and stroke) are higher in elderly patients. However, many studies reported positive effects of valvular surgery on QoL in the elderly (Levin et al., 1998; Vicchio et al., 2007). One study examined the QoL among elder people aged over 80s with aortic valve replacement (Sundt et al., 2000). An excellent improvement was reported in their cardiac functions and five dimension of QoL as measured by Medical Outcomes Study SF-36, including bodily pain, general health, social functioning, emotional role, and mental health. Moreover, as summarized in the previous part, age may affect patients' QoL through different perceptions of MHVP sound that younger patients perceive more disturbances caused by MHVP sound (Laurens et al., 1992; Limb et al., 1992).

Gender

The degree of improvement in various aspects of QoL varies between genders. Some studies reported lower levels of improvement in women (Aboud, et al., 2009; Yun et al., 1999). However, another study investigated the gender differences in QoL in patients with valvular surgery and reported different findings (Taillefer et al., 2005). It was reported that women demonstrated more improvements in leisure, affectivity, and social functioning than men, but less improvements in mental health. Similarly, gender would also influence the QoL by different perceptions of MHVP sound, as females reported greater annoyance than males (Laurens et al., 1992; Limb et al., 1992).

As to the influences of age and gender on patients' QoL, all of these studies were conducted in western population. Whether the age and gender differences in QoL exist in Chinese patients still needs to be explored.

Waiting time for surgery

The waiting time for an operation may lead to negative impacts on the QOL (Traillefer et al., 2005). In Hong Kong, the average waiting time for MHVP implantation surgery was four months (Prince of Wales Hospital, 2009). During the waiting period, patients' physical conditions may deteriorate and their anxiety levels may increase. Thereby, the waiting time brings about negative impacts on patients' QoL (Traillefer et al., 2005).

CONCLUSIONS

With the rapid ageing worldwide, the prevalence of valvular heart disease is expected to increase. MHVP implantation is an effective treatment for patients with valvular heart disease. Various factors, including the life-long ACT, valve sound, age, gender, and waiting time, have impacts on the QoL in patients with MHVP. Understanding these influencing factors can provide valuable information to health care professionals, especially the nurses, on providing education and recommendations to this group of patients.

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