



BMH Med. J. 2018;5(1):1-3 **Editorial**

Prehabilitation Before Major Surgery

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Prehabilitation is a new term for preoperative rehabilitation before major surgery [1]. Some authors use the short form '*Prehab*', though it is not so widely used. Prehabilitation involves measures to improve the physical, physiological, metabolic and psychosocial reserves in preparation for an elective surgery [2]. This involves exercise, nutrition, education and psychosocial interventions.

It has been found that even in the absence of complications, there is significant reduction in functional capacity after major abdominal surgery [3]. This may be more in frail elderly individuals, which may take even months to revert to preoperative levels and that too partially [4]. Impaired functional capacity documented by preoperative cardiopulmonary exercise testing as reduced oxygen uptake at anaerobic threshold and elevated ventilatory equivalent for carbon dioxide is associated with all cause mortality after major abdominal surgery. Cardiopulmonary exercise testing can identify high risk patients more than clinical risk factors alone [5].

Earlier, the stress was on post operative rehabilitation to improve recovery. But now the focus has shifted to prehabilitation prior to scheduled surgery, which utilizes the usual waiting period for surgery in most major centers. One of the early reviews on prehabilitation found data on 275 elderly patients undergoing abdominal or cardiac surgeries [6]. They recommended a 3 month progressive exercise prehabilitation program at 45-65% of maximum predicted heart rate along with periodic high intensity interval training. Extra intake of carbohydrate prior to exercise sessions and mixed protein and carbohydrate intake shortly after the session were included. Prehabilitation was found to reduce postoperative complications and hospital stay, improved quality of life and reduced decline in functional capacity.

Multimodal prehabilitation can involve nutritional counseling, protein supplementation and anxiety reduction in addition to exercise programs. A pilot study with one month trimodal prehabilitation showed improved functional recovery [7]. Analysis of data from 185 participants with colorectal cancer included in a pilot study and two randomized controlled trials from 2010 to 2015 has been recently published [8]. Functional capacity was assessed with six minute walk test and changes before surgery, at four weeks and eight weeks after surgery were determined. An increase in six minute walk distance of at least 19 m was taken as clinically significant. Endurance exercise training sessions of 20-30 minutes were given on three days a week. Resistance exercise involving major muscle groups was given two times per week. Sessions were preceded by warm up sessions and

concluded with cooling down activities. Nutritional supplementation included total protein intake of 1.5 g/Kg/day. Prehabilitation was started 4 weeks prior and continued for two months after surgery. Control group received trimodal rehabilitation program after surgery and discharge from the hospital. Significant improvement in preoperative physical fitness was documented in the prehabilitation group. There was a decrease in physical status at 4 weeks post surgery in both groups, but reduction was significantly higher in the control group. At eight weeks, the change in functional capacity was significantly higher in the study group. No adverse events were reported due to the multimodal prehabilitation, though compliance with the program was lower in the post operative period compared to preoperative period. This data set did not show any difference in the length of hospital stay or postoperative complications.

Patients with poor baseline walking capacity are the ones with generally higher risk. But these are exactly the persons who are more likely to benefit from prehabilitation programs [9]. A subgroup analysis of 106 participants included 36 patients with a six minute walking test distance of less than 400 m and 70 who could walk over 400 m. Patients with lower baseline fitness had greater improvement in functional walking capacity with prehabilitation. At 4 weeks after surgery, those with lower baseline fitness were more likely to have recovered to their baseline walking distance than those with higher fitness (74% vs 50%, $P = 0.029$). This is akin to the well known dictum in medicine that any treatment intervention is likely to give more benefit in those at higher risk.

All these data on benefits of prehabilitation have come from abdominal surgeries. But the data on orthopedic surgery where more number of studies have been conducted is a bit disappointing. A recent systematic review identified 17 studies which met their quality criteria [10]. Of these 13 studies were in orthopedics, mainly knee or hip arthroplasty for osteoarthritis. They found no evidence that prehabilitation provides better function, pain relief or quality of life in those who had arthroplasty for osteoarthritis. But prehabilitation of more than 500 minutes may reduce acute rehabilitation admissions after surgery. They found that the evidence is insufficient to give recommendations on benefits of prehabilitation in other surgical groups.

Preliminary data on the feasibility of rehabilitation prior to coronary artery bypass graft surgery has demonstrated that none of the 15 patients developed cardiac symptoms during study participation [11]. There was an increase in the six minute walking distance and an improvement in the gait speed. Enrollment in cardiac rehabilitation program three months after surgery was also higher in the prehabilitation group (100% vs 43% in the control group, $p < 0.05$).

Though prehabilitation programs are generally risk free, being conducted in well equipped centers with adequate preassessment and a tailored program, a systematic review of 21 studies noted two adverse events in 669 exercising participants [12].

To conclude, prehabilitation is certainly worth a trial if time and resources permit, more so in certain abdominal surgeries which can wait till prehabilitation is completed. Larger well planned randomized studies are needed to place prehabilitation in its actual perspective. Role of shorter term prehabilitation has also to be assessed as adequate time may not be available for prehabilitation in most scenarios.

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