Spinal Cord Injury, Obesity and Weight Management - A new challenge

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Introduction

- Individuals with spinal cord injuries (SCI) commonly present with combined risk factors for Cardiometabolic syndrome (CMS) increasing the threat of cardiovascular disease (CVD). These primary risk factors include obesity, dyslipidaemia, insulin resistance, and hypertension[1]. (**Figure 1)**
- The main reasons for developing CMS are altered body composition with high visceral adiposity and loss of lean tissue, reduced metabolic rate, limited mobility, depression, inability to do exercises which help to reduce weight and often observed poor in dietary habits.
- Obesity is a global problem that disproportionately affects those with SCI. Prevalence is conservatively estimated at 66%[2] contributing to higher than average rates of diabetes and CVD[3]. Impact on a SCI person is greater still as it can also affect their mobility, skin, bowel management and activities of daily living[3].

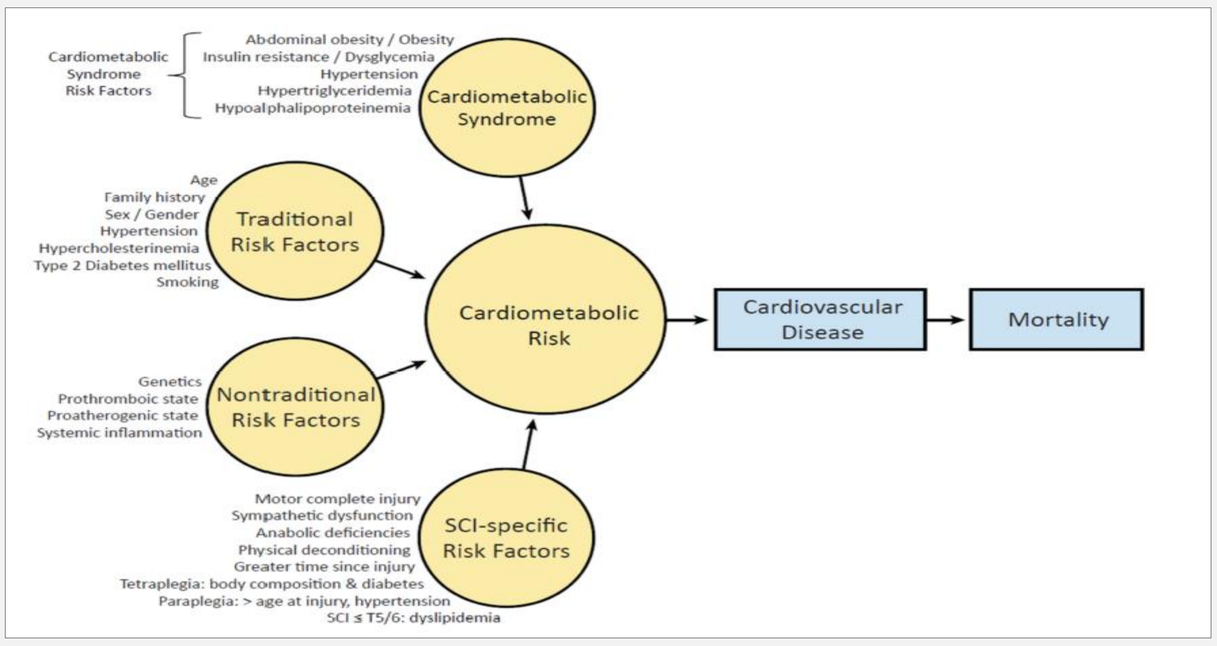

Figure 1. Interconnected risk factors of Cardiometabolic risk and Cardiometabolic syndrome and their progression to cardiovascular disease and mortality [1]

Objectives

- To describe the SCI obesity landscape, magnitude of the problem, challenges, and our novel approach.
- Advocate easy, reproducible measurement for all centres and future aspirations for more advanced techniques/interventions including tertiary referrals to consider Bariatric surgery.

Measurement Difficulties

- BMI is the most widely used measure of obesity but experts criticise its lack of sensitively for those with SCI. Standard BMI cut-offs were established to denote marked increases in morbidity and mortality associated with percentage fat mass. Individuals with SCI have altered body composition and higher body fat percentage so the normal cuts off needs adjustment[4]
- Waist circumference (WC) is a valid measure of visceral adiposity in the general population, in a standing position thus the technique cannot easily be applied to the SCI population.
- Skinfold and arm circumference measures usually accurately reflect whole body size in many population groups but cannot be relied upon in SCI due to limb wasting, where you see obvious disparity with trunk size.
- Bioelectrical Impedance (BIA) has promising bedside application but is not commonly used outside of the research environment and is yet to be validated in this group.

Other Challenges

- Disparity in weight management services and with commercial groups there are issues with access into buildings and weighing scales.
- Links from SCI centres to Specialist Bariatric Surgery Centres are non-existent and most Bariatric Centres will have little or no experience of intervention with a patient with SCI.
- Our service at the Royal National Orthopaedic Hospital was able to establish links to two such centres and create a robust referral pathway for our patients for priority assessments and interventions.
- SCI-related behaviours and comorbidities such as unhealthy eating, smoking and depression.

Evidence

- Greatest weight reduction and BMI correlation was produced by bariatric surgery, followed by a combination of PA and diet the[5].
- Diet, PA(Physical Activity) and behaviours modifications are integral components of weight management programmes.
- Total fat mass can be predicted by DEXA/BIA[6,7].
- Both Basic Metabolic Rate and Energy Expenditure are reduced in chronic SCI[8].
- individuals with a BMI lower than 30 kg/m^2 are often considered obese using BIA, indicating low sensitivity of BMI cut off values for individuals with paraplegia[9].

Recommendations

- Evaluate all adults with SCI for CMS at the time of discharge from rehab[10]. Screen adults with SCI for diabetes, pre-diabetes and lipids
- Assess for obesity at discharge from rehab using either body composition BIA/DEXA until validated, clinically appropriate equations become available – men FM>22%, women FM>35% as obese and high risk CMS OR use adjusted BMI $\geq$22 kg/m^2 as the cut off point when used as a surrogate marker of obesity in adults with SCI – high risk CMS.
- Conduct indirect calorimetry if there is equipment
- Promote healthy dietary composition (DASH/Mediterranean) and build up to 150mins of activity per week
- Even though bariatric surgery is usually considered as a last resort we would strongly recommend early and proactive consideration for persons with morbid obesity and SCI due to significant risk. Provide SCI specialist consultation in all pre, peri and post operative stages. In our opinion this should start with BMI $\geq$30 kg/m^2.
- Every centre should form robust links to tiered weight management services.

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