Obesity and the risk of cardiovascular disease and diabetes mellitus

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The increasing prevalence of obesity worldwide has many experts concerned about the worsening health of a large proportion of the population. It is well recognized that obesity is associated with a higher mortality, an increased risk of hypertension and hyperlipidemia, cardiovascular disease, diabetes mellitus, osteoarthritis, gall bladder disease and possibly some cancers. Currently it is estimated that over two thirds of adults in the United States are overweight and nearly one third are clinically obese.1 Of special concern is the rapid increase in obesity among children. Other countries both developed and developing are experiencing similar trends.

The National Heart, Lung, and Blood Institute (NHLBI) has published clinical guidelines recommending screening all patients for overweight or obesity as a part of a regular office visit.2 At screening, physicians can identify people who have cardiovascular disease, diabetes mellitus or the metabolic syndrome (MetS). Early intervention can then help prevent the development of diabetes and reduce the long-term risk of cardiovascular events.

The metabolic syndrome is defined as a constellation of risk factors including increased adiposity, hypertension, dyslipidemia, and insulin resistance that may increase the risk of cardiovascular disease and diabetes mellitus. Most individuals with the metabolic syndrome will fall into the moderate risk category for cardiovascular disease defined as a 10 to 20% ten year risk.3 A number of groups have formulated definitions of the metabolic syndrome including the National Cholesterol Education Program (NCEP), the World Health Organization (WHO), and the International Diabetes Federation (IDF). They all have emphasized the role of obesity in promotoing the clustering of risk factors and suggest that central or abdominal obesity may be the root cause of the increased risk of cardiovascular disease and diabetes. The IDF has recommended that ethnic specific measurements of adiposity for central obesity be used to enhance the diagnostic ability of the definition for certain groups.

The metabolic syndrome can identify individuals that are at increased risk. From analysis of National Health and Nutrition Examination Survey (NHANES) data in the United States, the metabolic syndrome was associated with a significantly higher risk of cardiovascular disease and total mortality.5 Investigators from Finland also showed a significant increase in cardiovascular disease and all-cause mortality in a cohort of middle-aged Finish men with metabolic syndrome using either the WHO or NCEP definition of MetS.6 In this same cohort, there was a five- to nine-fold increased likelihood of developing diabetes during follow-up of individuals with MetS.

Analysis of the different factors that make up the definition of the metabolic syndrome suggest that fasting triglyceride levels or a ratio of triglyceride/high-density lipoprotein cholesterol concentration > 3.5 is a sensitive and simple means of identifying insulin resistant patients.7 Although most groups agree that obesity is an important component of the metabolic syndrome, there has been some controversy on how to best define and measure adiposity. Measurements of adiposity have included the waist-hip ratio, body mass index, waist circumference, and skin-fold thickness at different points. Waist circumference has been shown to correlate well with abdominal visceral adipose tissue as measured by computed tomography and was better related to cardiovascular disease risk factors than the waist-hip ratio.8 However, even mildly overweight individuals may develop insulin resistance and diabetes but not fit the current cutoffs used in the metabolic syndrome definitions.

Toan C. Nguyen and colleagues in this issue of the Journal of Geriatric Cardiology used skin fold thickness at an abdominal point in a definition of metabolic syndrome and showed a good correlation to currently used definitions of the metabolic syndrome.9 This group has previously shown that skin fold thickness measurements at the level of the abdomen correlated well with insulin resistance.10 The use of different anthropometrics with laboratory values such as plasma triglyceride levels can be used to identify a group at high risk for the development of diabetes and subsequent cardiovascular disease. Nguyen and colleagues show that many patients may have the abnormalities of the metabolic syndrome without meeting the criteria for waist circumference even when using ethnic specific values. Skin fold measurements may help identify this higher risk cohort.

Many experts have questioned if the metabolic syndrome exists as a separate syndrome or does not give any further information than the sum of its parts. Designation of the syndrome can be useful if it is able to identify a cohort of individuals at higher future risk of diabetes and cardiovascular
disease. The syndrome can also help to recognize that multiple risk factors tend to coexist in the same individual. As a follow-up to the study by Nguyen and colleagues, it will be important to determine if use of skin fold measurements adds any further predictive value to the definition of the metabolic syndrome. Skin fold values have the advantage of an easily obtained measurement that most clinicians should be able to obtain at a patient visit. To be useful, however, skin fold measurements will need to be shown to offer greater predictive advantage to other easily obtained measurements of obesity such as body mass index and waist circumference.

The treatment of metabolic syndrome should focus on a reduction in obesity. A lifestyle program consisting of dietary change and exercise is the cornerstone of therapy for the metabolic syndrome. The Diabetes Prevention Program showed that exercise and diet was able to achieve a significant reduction in the development of diabetes in a group of patients with impaired fasting glucose. Every patient visit can be used as an opportunity to teach patients about a healthy lifestyle and encourage compliance with a program. In addition to a lifestyle program, individual risk factors should be assessed and treated. It is important to remember that many patients present with a clustering of risk factors and that successful reduction in cardiovascular risk will only be achieved if all the important risk factors are treated.

References