Chest Pain Without Blocked Coronary Arteries

Squeezing chest pain known as angina occurs when heart muscle cells don't get enough oxygen rich blood. Most of the time, this is caused by build up of fatty plaques inside the coronary arteries which restrict normal blood flow. But sometimes, angina occurs from problems in the network of tiny blood vessels in the heart - a condition called coronary microvascular disease.

These people, when they undergo cardiac catheterization will have mild or no blockages. These individuals are often middle-aged women with cardiovascular risk factors, including obesity, diabetes, hypertension, and high cholesterol. In the absence of significant blockages, their symptoms often misdiagnosed as gallbladder disease, indigestion, or sometimes their imagination.

It is known that about 50% of the people undergoing coronary geography have no evidence of flow limiting plaques and yet many still experience symptoms of angina, typically doing exercise or mental stress. This used to be called SYNDROME X in the past. Today it is called. ISCHEMIA WITH NO OBSTRUCTIVE CORONARY ARTERIES(INOCA).

OXYGEN SUPPLY DEMAND MISMATCH: Normal coronary arteries and their branches are able to regulate the flow to the heart muscle cells by dilating or narrowing, thus giving the heart oxygenated blood needed to perform it's pumping function. Regulation of the coronary blood flow to the heart is governed by chemicals, secreted by heart muscle cells, and the cells lining the coronary branches.

This process happens at the level of the micro vessels, which are too small to be seen on coronary angiography. When this processe is disturbed, the supply of blood may not meet demand and symptoms consistent with those of the blocked coronary arteries occur.

WHAT GOES WRONG: INOCA comes in 2 main forms. In the most common form called microvascular angina, the inner walls of the smaller arteries may thick and loose their ability to expand and contract in response to the demand for increased blood flow, such as during exercise or during emotional stress.

In addition, the sheer number and total volume of capillaries (tiniest vessels) are lower in people with micro, vascular disease, compared to people who don't have this. Smoking, hypertension, high cholesterol, and type 2 cancers diabetes are risk factors along with obesity and sedentary lifestyle. The other less common type is called Vasospastic angina.

Muscles within the heart's arteries suddenly clamp down, causing spasm of the coronary arteries. This brief, temporary spasms blocks blood flow to the heart muscle resulting in reduced blood flow to the heart muscle. The same risk factors responsible for micro vascular dysfunction can lead to this problem, although smoking is particularly potent risk factor in this patient population.

There may be other courses also. Estrogen has a role in preserving microvascular and endothelial health. Because 60 to 70% of the patient with micro vascular dysfunction are women in their mid 40s to mid 60s, one hypothesis is that INOCA maybe related to the reduced estrogen level occurring around menopause.

On the other hand, spasm seems to be more common in men, specially, those of Asian descent.

TESTING FOR INOCA: Unfortunately, testing for micro vascular disease is not widely available in the US. The best non-invasive test for diagnosing or ruling out, micro vascular disease is POSITRON EMISSION TOMOGRAPHY (PET) stress testing. However,this test is not widely available The other way to diagnose microvascular disease require more specialized testing.

A coronary flow reserve.(CFR) test which measures how well the heart circulation can deliver blood under stress versus at rest . It can be done by placing a wire with sensors in the coronary arteries to measure the quantity of blood flow and resistance to flow at rest, and when the heart is stressed by administering a drug that dilates blood vessels,mimicking the effect of exercise .

By comparing the ratio of coronary blood flow under stress to that rest,microvascular disease can be diagnosed For testing for spasm, the operator injects very small doses of a drug that can provoke the spasm for a few seconds and watch how artery responds .

Patient with coronary spasm may briefly feel chest pain following the injection, and artery will be seen to spasm on the screen before the effect of the drug dissipates.

TREATING INOCA: The same risk factors that contribute to blockages in the larger arteries, such as high blood pressure, high cholesterol, smoking, and diabetes, are also common in people with microvascular disease.

As a result, many people with coronary artery, micro, vascular disease also receive other common medication, such as cholesterol, lowering drug, high blood, pressure medication, Medication for controlling a blood sugar. Lifestyle and medication changes to improve heart disease risk factors also beneficial.

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