Relevant Vascular Anatomy in Anterior Lumbar Intersomatic Fusion (ALIF) approach: an Magnetic Resonance (MRI) study in the Brazilian population.

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Introduction

Lumbar interbody fusion is a classical surgical method for the treatment of lumbar degenerative disease and the ALIF has the potential to improve sagittal alignment and restore disc height, while indirectly decompressing neural elements by increasing the foraminal space. Additionally, ALIF technique can be performed by a minimally invasive approach through smaller incisions without compromising posterior tension bands, facets or causing posterior muscular injury. Shortcoming of the ALIF technique include the retraction of the iliac vessels (artery and vein, specially left iliac vein), which can increase the risk of direct vascular injury or deep venous thrombosis, two of the most feared complications in this type of approach. The anatomical localization of the vessels in the L4-L5 and L5-S1 disc space, associated with the configuration of the left iliac vein and the presence of adventitious tissues between the vessel and the disc are, in conjunction, important information to be considered preoperatively when the surgeon plans the ALIF surgery.

Materials & Methods

This is a retrospective, descriptive study, using data from 200 lumbar MRI of patients who sought medical care complaining of low back pain and/or sciatica, between January 2018 and June 2020, at Hospital Vera Cruz in Belo Horizonte, Minas Gerais, Brazil. The images were evaluated in T2 weighting from the lumbar levels L1 to S1 in the axial and sagittal sections and were used to make the necessary measurements at the level of the surgical window of L5-S1. The main characteristics of the vasculature were also evaluated, the shape of the vessel, oval or flat and the presence of fat between the vessel and the disc.

Results

Two hundred MRI from patients with an average age of 49.68 years, of which 52% were of female. The distance between the left iliac vein and the right iliac artery in L5-S1 had an average equal to 27.48mm, with 35.2% of the cases having distance between the interiliacs from a range 20-30mm. The standard deviation of the interiliac measurement in the male population shows that the mean varied more among men (22.99; 27.08) ($p= 0.001$). Bifurcation of the aorta artery was more frequent on L4 in 56.3%, followed by L4-L5 with a 25.6%. The confluence of the iliac veins in the inferior vena cava is more frequent on L4 vertebra, 37.2%, then L5 in 32.2% of cases. The morphological anatomy of the vessel in this

study was divided into 2 groups: oval shaped or flat, representing 69% and 31%, respectively. Fatty tissue was evidenced posterior to the vein in only 60.5% of patients.

Conclusions

ALIF approach can be carried out in a large part of the Brazilian population because of lumbar vascular anatomy has a tendency to follow a pattern, but it can come together with a variation of the anatomy, meaning a preoperative investigation. MRI allowed an effective assessment of the relationship between large vessels and the lumbar spine, being able to make a surgical planning and reducing the risk of vascular injury.