

Radiological evaluation of fusion patterns after Minimally Invasive Lateral Lumbar Interbody fusion with 3D-printed porous titanium cages versus titanium threaded cages

Velluto C., Perna A., Borruto M.I., Capece G., Cruciani A., Tamburrelli F.C., Proietti L.

Introduction

The evaluation of segmental fusion after Lateral Lumbar Interbody fusion (LLIF) using 3D-printed porous titanium cage is still not well studied. Different criteria could be used to assess the fusion rate such as **bone bridges (BB)** between two contiguous vertebra that is reported as pathognomonic criteria for anterior fusion. However, there are few radiological investigations on zygapophyseal joints (ZJ) status after LLIF with porous titanium cages versus conventional titanium threaded cages. In fact, the **porous architecture** of a recently developed titanium intervertebral cage seems to improve the bone-to-implant fusion rate. The aim of this radiological study was to investigate the different fusion patterns after LLIF using 3D-printed porous titanium cage compared with the titanium threaded cages.



VS



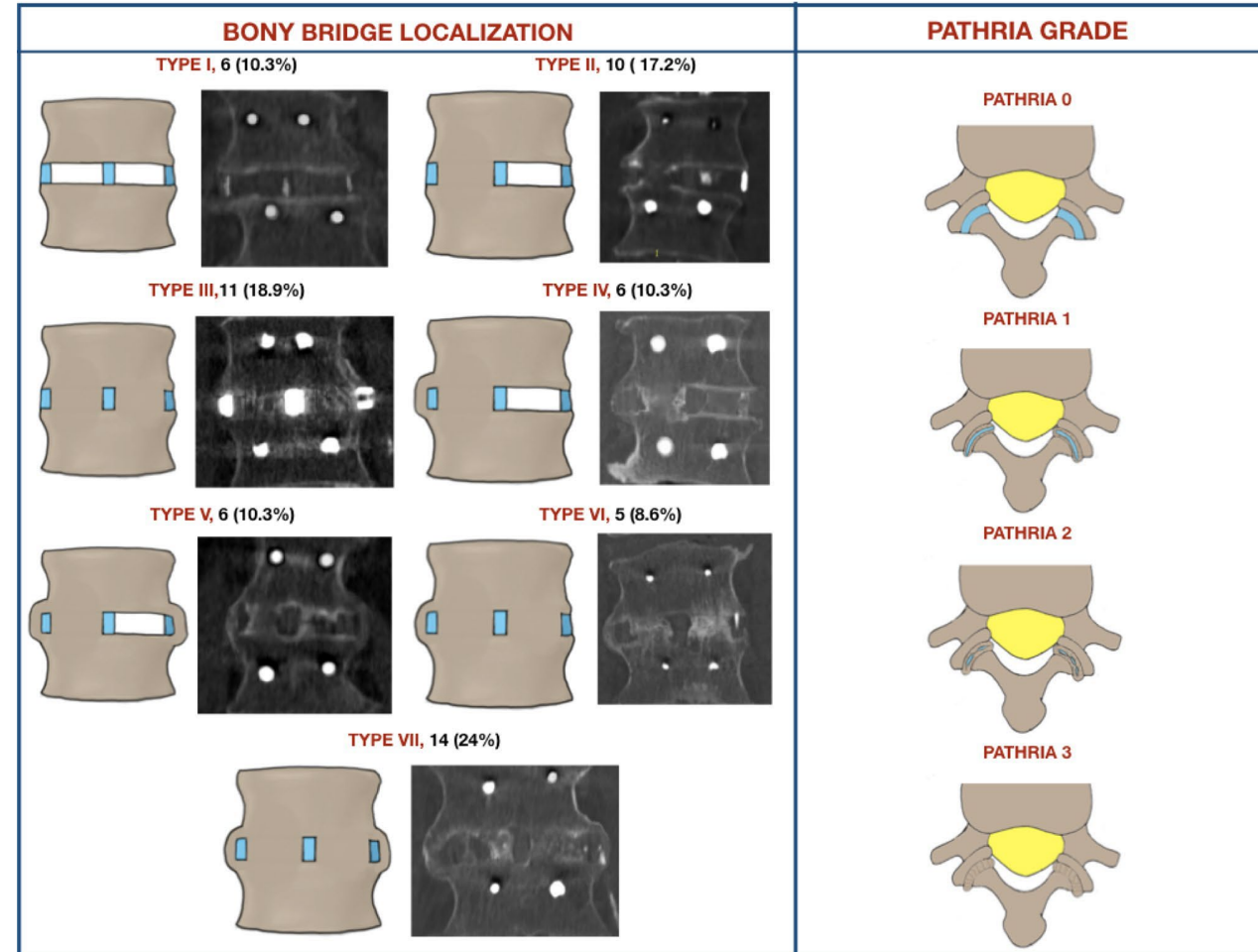
Material and methods

A retrospective single-centre radiological study of **97 patients** who underwent Lateral Lumbar Interbody fusion (LLIF) and posterior percutaneous screw fixation for degenerative spondylolisthesis, was conducted. In **46 patients** (Group A) was implanted the novel porous titanium cage whereas in **51** the titanium threaded cages (Group B). Complete radiological data and a minimum follow-up of 12 months were the inclusion criteria. Intervertebral bone bridges (BB) were investigated for evaluating anterior fusion and zygapophyseal joints (ZJ) ankylotic degeneration was evaluated according Pathria et al., as evidence of posterior fusion and segmental immobilization.



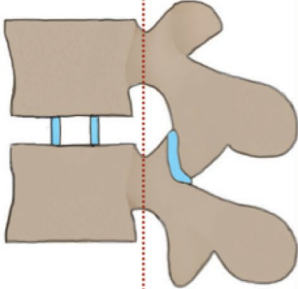
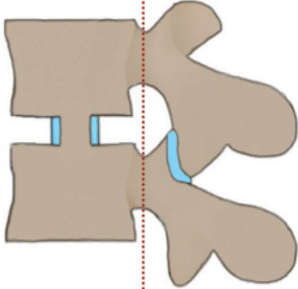
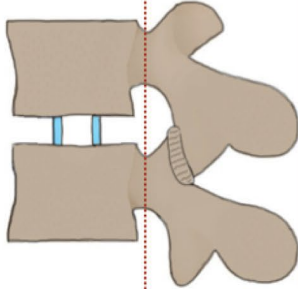
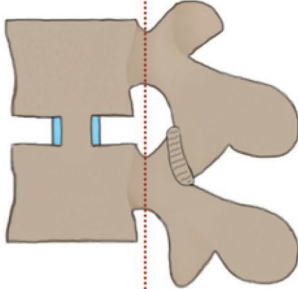
Results

Twelve months after surgery, in the first group intervertebral BB were recognized in 41 segments (**86.95%**), whereas in the second one was **76.47%** (39 segments). ZJ Pathria grade was I in 7 (15.21%) patients of Group A, whereas in 5 of Group B (9.8%). Grade II was reported in 13 (28.26%) patients of Group A and in 10 patients (19.60%) of Group B. Finally, the posterior fusion described as grade III was evaluated in 36 (78.26%) in the first one, while 33 (64.70%) in the second one.



Discussion

Radiologic evidence of successful vertebral interbody fusion has traditionally been based on bridging bone and facet joint fusion. Our findings after one month follow up demonstrate that patients treated by 3D-printed porous titanium cage (group A) show an **earlier vertebral interbody fusion** compared with patients treated with standard titanium cage (group B).

NO FUSION		PARTIAL FUSION		FUSION			
ANTERIOR	POSTERIOR	ANTERIOR	POSTERIOR	ANTERIOR	POSTERIOR	ANTERIOR	POSTERIOR
							
NO FUSION		FUSION		NO FUSION		FUSION	
PATHRIA 0 -1 - 2 (NO FUSION)				PATHRIA 3 (FUSION)			
NON IMMOBILIZED				IMMOBILIZED			

Conclusions

Our results seem to suggest that the bone-to-implant fusion rate of **3D-printed porous titanium cages** and allow to achieve **early segmental immobilization**. Further properly designed investigations are needed to investigate eventual clinical–radiological correlations.

