

# Od embalaže do pacientu in kirurgu prilagojenega pripomočk

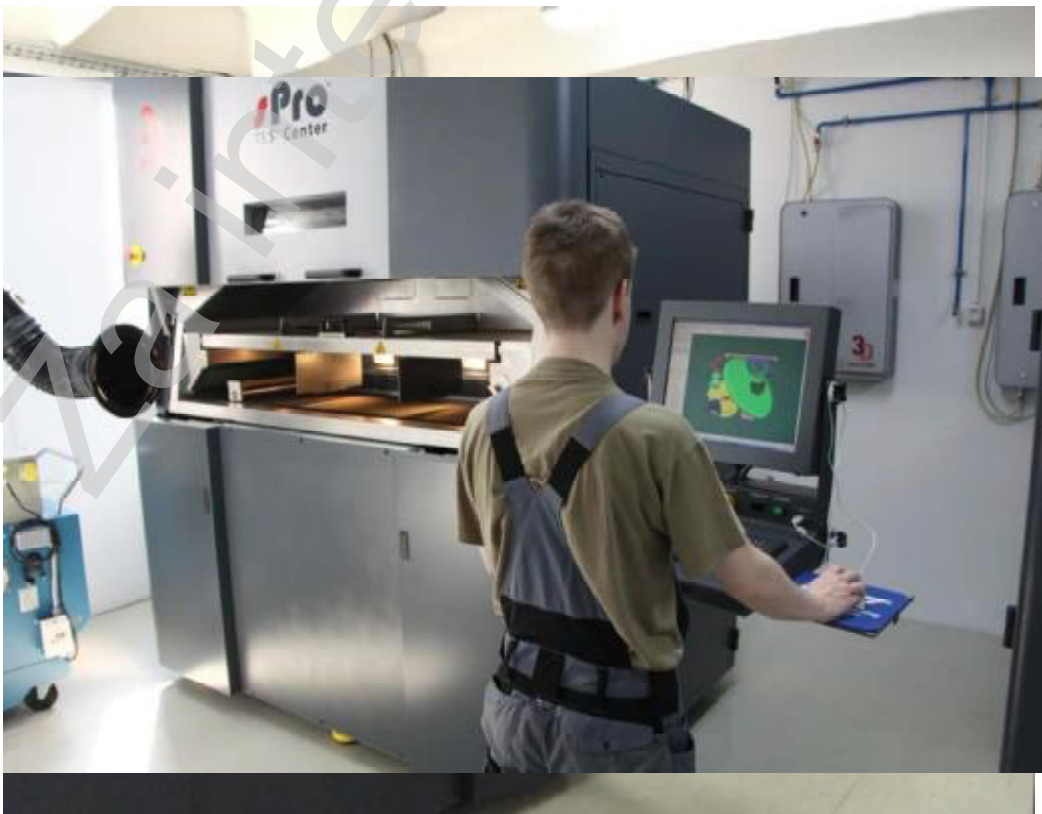
Uporaba dodajalnih tehnologij v  
medicini

Igor Drstvenšek

3D-TISK / PRILOŽNOSTI ZA INDUSTRIJO



## SLS – Strojni park



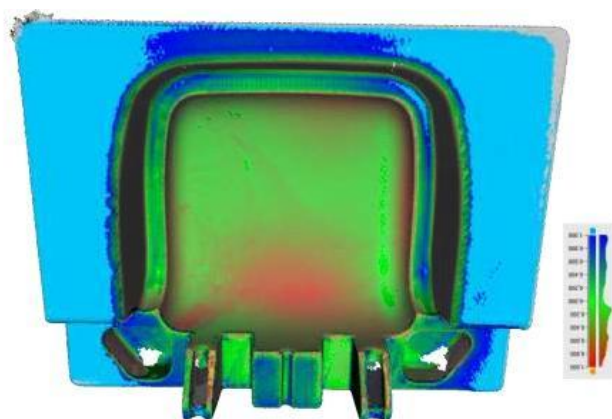


## Primeri uporabe



## Orodja za penjenje vzglavnikov

- Generirana poroznost z mrežasto strukturo





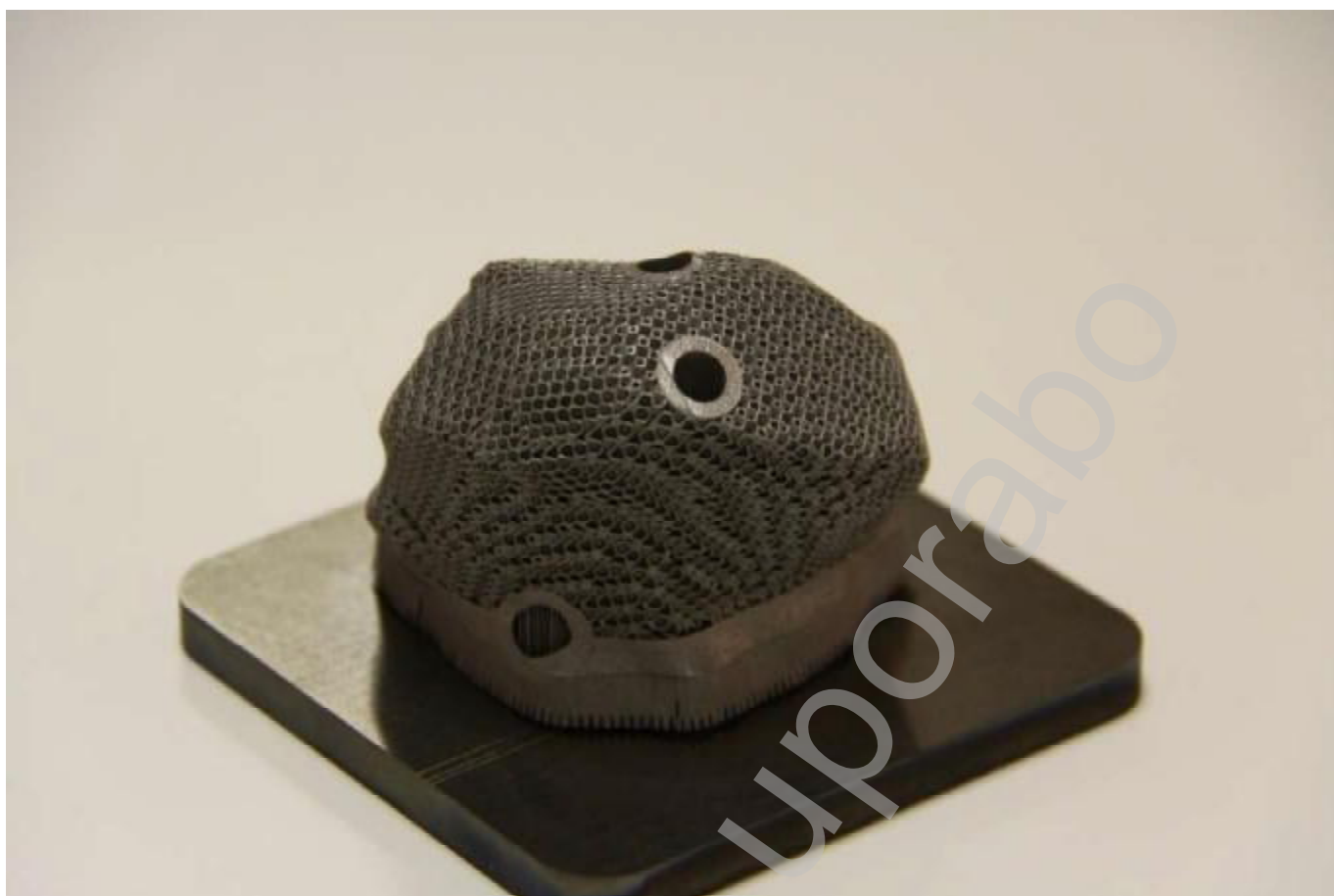
## Kovinski izdelki

- mLab
- CoCrW
- Ti6Al4V



## Uporaba v medicini

- Komunikacijski modeli in načrtovanje operacij
- Orodja, vodila in pripomočki
- Vsadki



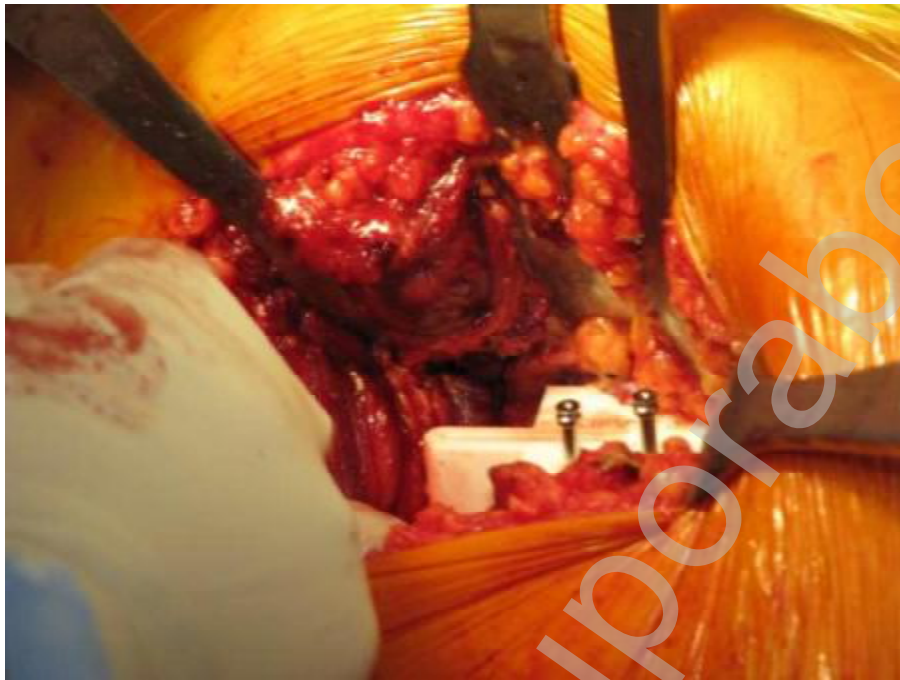
## Komunikacijski modeli



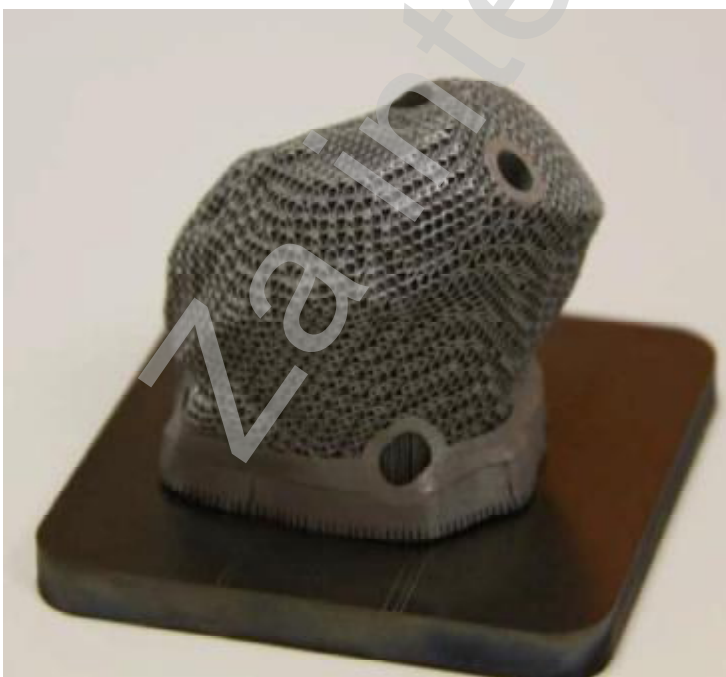




# Instrumenti in pripomočki

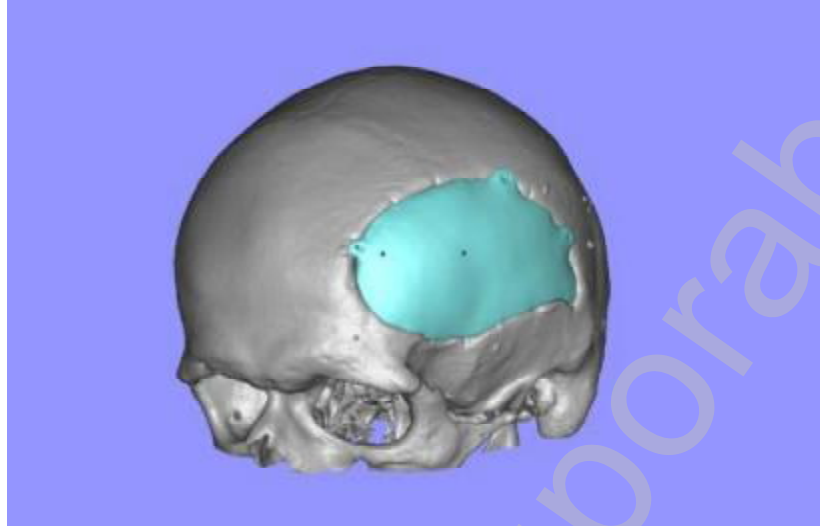


# Vsadki





# Kranioplastične operacije (2004)



## Implantation

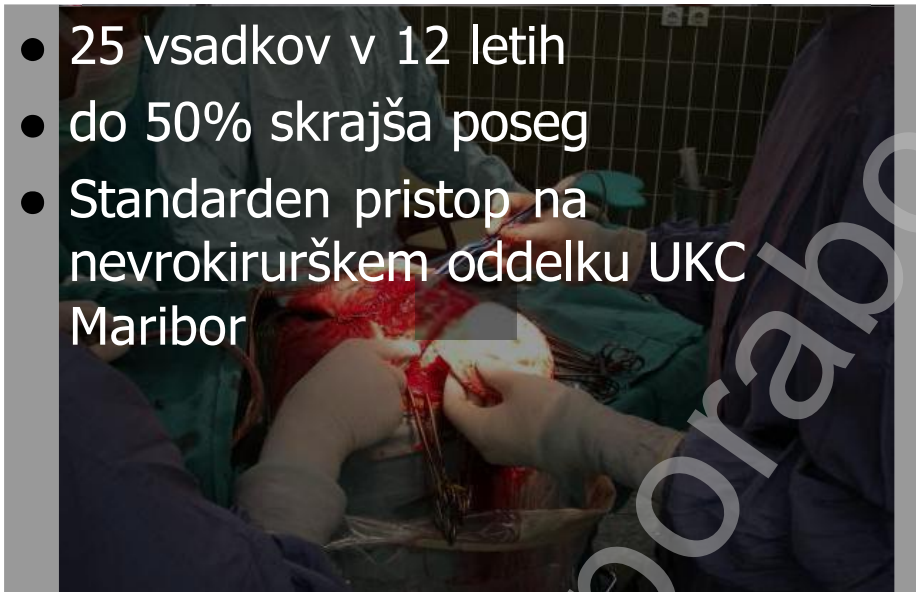
- University Clinical Centre Maribor  
Neurosurgical department





## PMMA vsadki

- 25 vsadkov v 12 letih
- do 50% skrajša poseg
- Standarden pristop na nevrokirurškem oddelku UKC Maribor



DRSTVENŠEK, Igor, IHAN HREN, Nataša, STROJNIK, Tadej, BRAJLIH, Tomaž, VALENTAN, Bogdan, POGAČAR, Vojko, ZUPANČIČ HARTNER, Tjaša. Applications of rapid prototyping in cranio-maxillofacial surgery procedures. International journal of biology and biomedical engineering, ISSN 1998-4510. [Online izd.], 2008, vol. 2, iss. 1, str. 29-38.

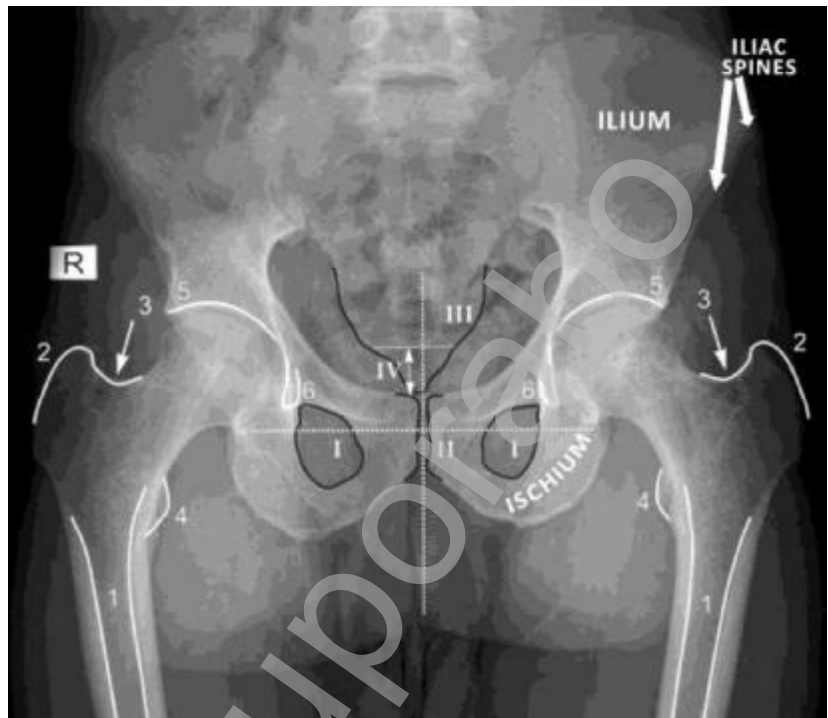


## Kolčni vsadki – 2D resničnost (2010)

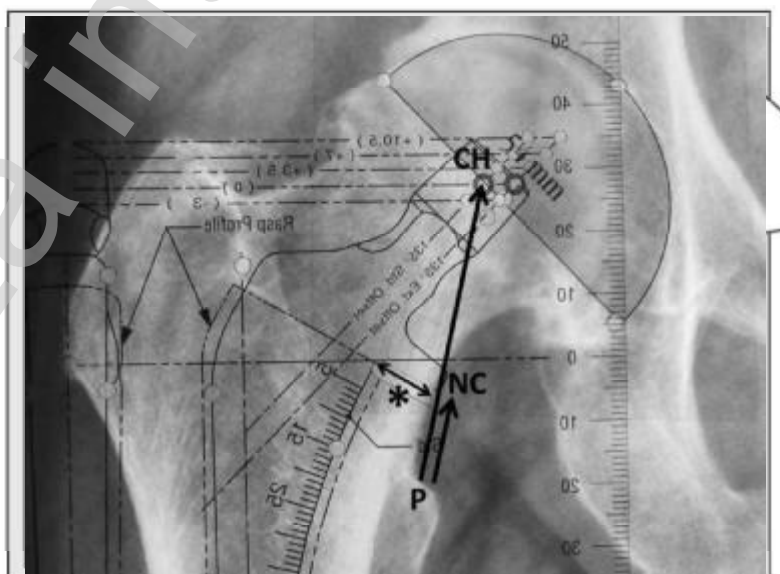


## 2D značilke na RTG

- Povečava?
- En pogled
  - Inklinacija
  - COR
  - Antevertza??



## Določanje velikosti vsadka









## Pripravljalni načrti



## Izdelava vodil





## Vodilo v akciji – stegnenica



21



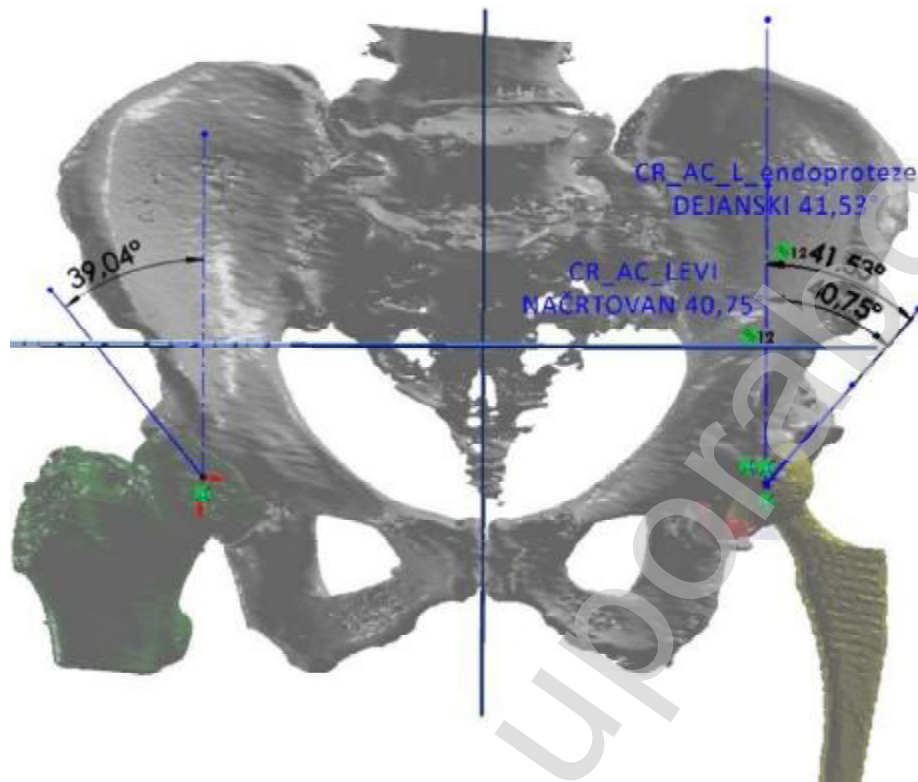
## Čašica kolka



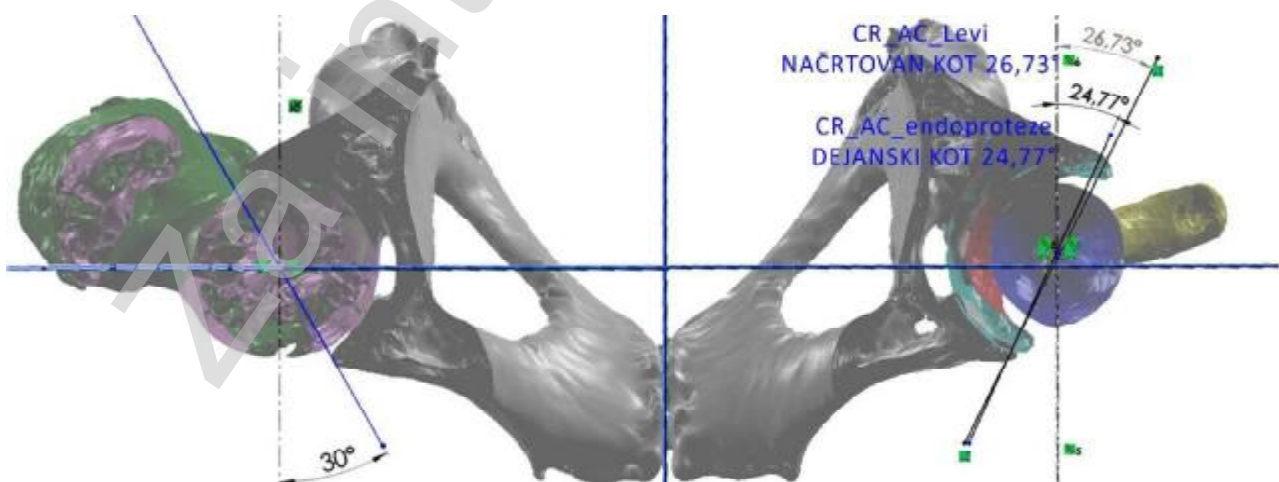
22



## Post OP rezultati - inklinacija



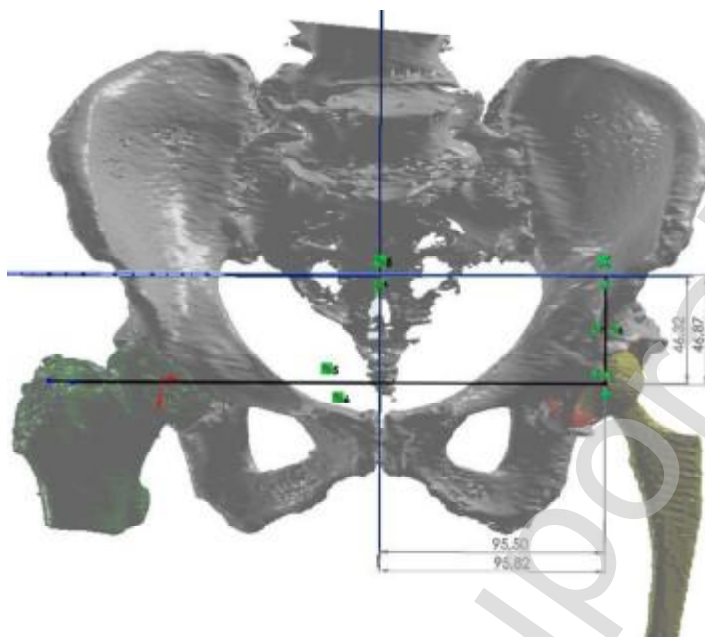
## Post OP rezultati - anteverzija



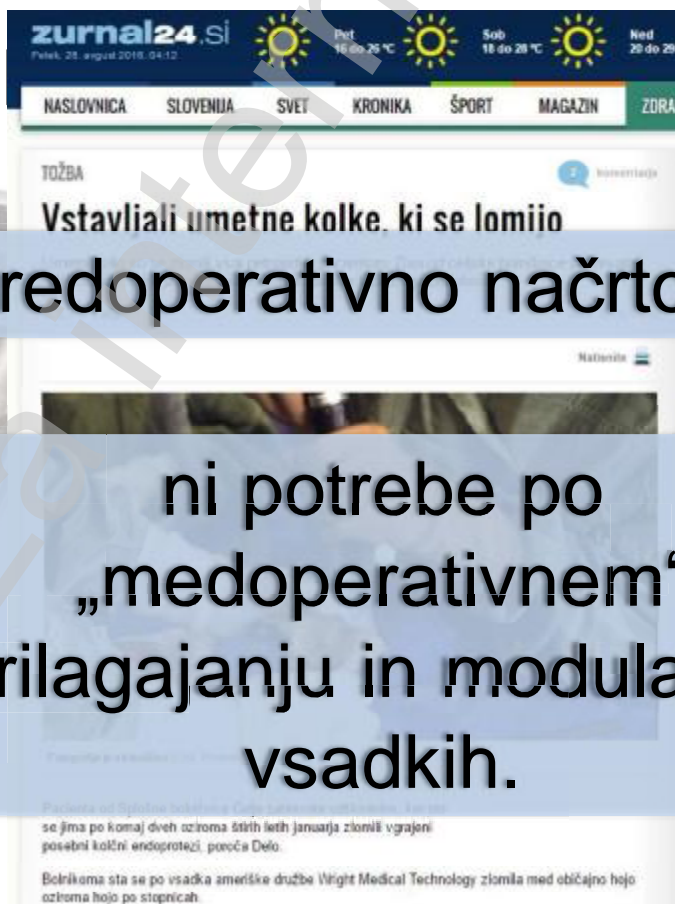




## Post OP rezultati - COR



„Crac



lity

3D, predoperativno načrtovanje;

ni potrebe po  
„medoperativnem“  
prilagajanju in modularnih  
vsadkih.



## The Wind of Change...

„3D načrtovanje? Fantje, v 5 letih, ne samo, da ga bomo vsi uporabljali, pač pa bo prepovedano delati drugače!“

Dr. Rihard Trebše, dr. med.  
specialist ortoped  
Ortopedska klinika Valdoltra



**“Engineers’ problem is that they don’t give surgeons what they need, but what they require!”**

**Dr. Stephen Rose**

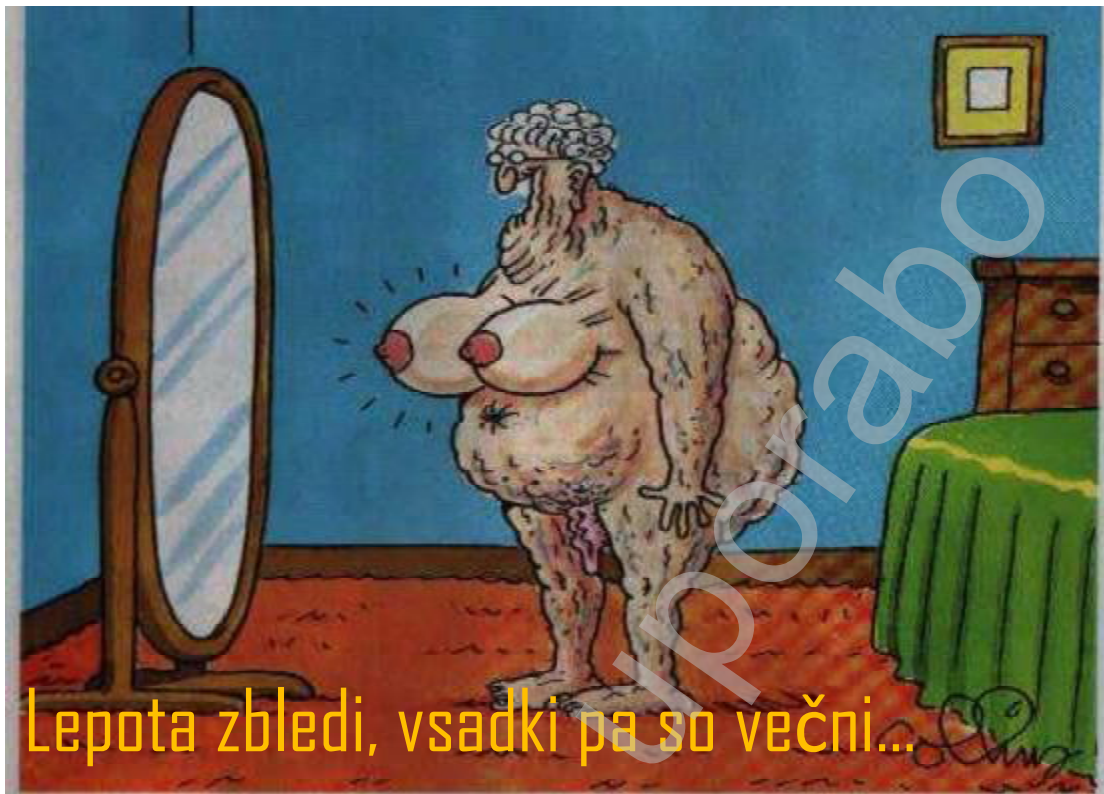
Dentist, colonel in US army,

produces implants for soldiers suffered in war(s).

(Medical Innovations Conference, Vienna, 30. 5. 2008)



# VPRAŠANJA?



**rapiman.net**

International Conference on Additive  
Technologies

- 6<sup>th</sup> bienial conference

**ICAT 2016**

Nürnberg, Mövenpick Konferenz Center Nürnberg Airport,  
November 29<sup>th</sup> - 30<sup>th</sup>, 2016

[www.icat.si](http://www.icat.si)