

Developing A Needle-Knife Surgical Device for Ultrasonic Assisted Surgery.

Ravaglia FFA^{1*} and Cliquet Jr A²

¹PhD Student of the Department of Surgery University of Campinas - UNICAMP Campinas SP Brazil

²Head of the Department of Orthopedic Surgery of University of Campinas – UNICAMP, Campinas SP Brazil

*Corresponding author

Ravaglia FFA, PhD Student of the Department of Surgery University of Campinas - UNICAMP Campinas SP Brazil

Submitted: 17 May 2022; Accepted: 24 May 2022; Published: 31 May 2022

Citation: Ravaglia FFA and Cliquet Jr A. (2022). Developing A Needle-Knife Surgical Device for Ultrasonic Assisted Surgery. *Int J Ortho Res*, 5(2), 92-96.

Abstract

Introduction: A new era of orthopedic surgery is happening nowadays. Procedures like Video Surgery, Ultrasound Guided Interventions, Pain interventions invasive orthopedics procedures, hydrodissection, dry needling; thermography assisted pain procedures and acupuncture started to be widely performed [1].

Objective: The aim of the project is to assess Ultrasonic assisted surgery in pig foot from butchery using three differences needle-knife devices.

Method: All three needles were used for ultrasonic assisted surgery in pig feet from butchery. An ultrasonic assisted surgery was performed in 9 pig feet. The two well developed digits were assessed. The pig has two larger central toes. These larger central toes bear most of the weight, but the outer two are also being used in soft ground. Two toes each foot was assessed, one medial and one lateral.

We numbered the pig foot from I to IX in roman figures. The first three I, II and III were used for needle A (control) for all medial and lateral toes.

The samples IV, V and VI were used for needle B for all medial and lateral toes.

The samples VII, VIII and IX were used for needle C for all medial and lateral toes.

The surgical technique consists in an ultrasonic assisted percutaneous tenotomy of the deep flexor tendon between distal and proximal phalanx near the sesamoid bone on the pig toe. Assessed for clinical release of the joint; gap in the plantar cushion pad and ecographic assessment. A final open dissection was performed [2].

Results: Model 3 presented similar features in rigidity to the baseline model 1 (3,6%). They have a similar performance. The tip of model 3 increased a tension of 15%; but does not mean fracture risk.

In ultrasonic assisted surgery in pig feet from butchery the geometry; puncture capability, cutting capability, tip deformation and tip fracture.

Geometry: Group A Control; group C and then group B

Puncture capability: Group B; Group C and then Grupo A.

Cutting ability: Group C; then A and then B. (tip of B deformation)

Resistance: Group A; then group C and then group B. Deformation: needle B has a tip deformation in 50 % of the cases.

Conclusion: Two different bisel tips needle shapes were modified from the original one metal guide of an intravenous catheter in order to improve the cutting ability as well as maintain the aspiration and infusion feature. One longer surface edge and another one not so long. The longest, although supposed to be the best performer is not strong enough and deformed. The second one is the most useful for needle knife instruments. More clinical study is recommended.

Keywords: Pig, Toe, Ultrasound Assisted Surgery, Needle-Knife

Introduction

A new era of orthopedic surgery is happening nowadays. Procedures like Video Surgery; Ultrasound Guided Interventions; Pain interventions invasive orthopedics procedures, hydrodissection, dry needling; thermography assisted pain procedures and acupuncture started to be widely performed [1].

Objective

The aim of the project is to virtually develop a needle knife surgical device to be useful for these interventions. Ultrasonic assisted surgery in pig foot from butchery was performed [1].

Method

Three different needles were compared by ravaglia and Cliquet (2002) [1]. The same needles were used in this research.

All three needles were used for ultrasonic assisted surgery in pig feet from butchery.

An ultrasonic assisted surgery was performed in 9 nine pig feet.

The two well developed digits were assessed. The pig has two larger central toes. These larger central toes bear most of the weight, but the outer two are also being used in soft ground. Two toes each foot was assessed; one medial and one lateral.

We numbered the pig foot from I to IX in roman figures. The first three I, II and III were used for needle A (control) for all medial and lateral toes.

The samples IV, V and VI were used for needle B for all medial and lateral toes.

The samples VII, VII and IX were used for needle C for all medial and lateral toes.

The surgical technique consists in an ultrasonic assisted percutaneous tenotomy of the deep flexor tendon between distal and proximal phalanx near the sesamoid bone on the pig toe. Assessed for clinical release of the joint; gap in the plantar cushion pad and ecographic assessment. A final open dissection was performed [2].



Figure 1: Pig Foot Sample.



Figure 2: Xray of pig foot antero posterior and lateral view

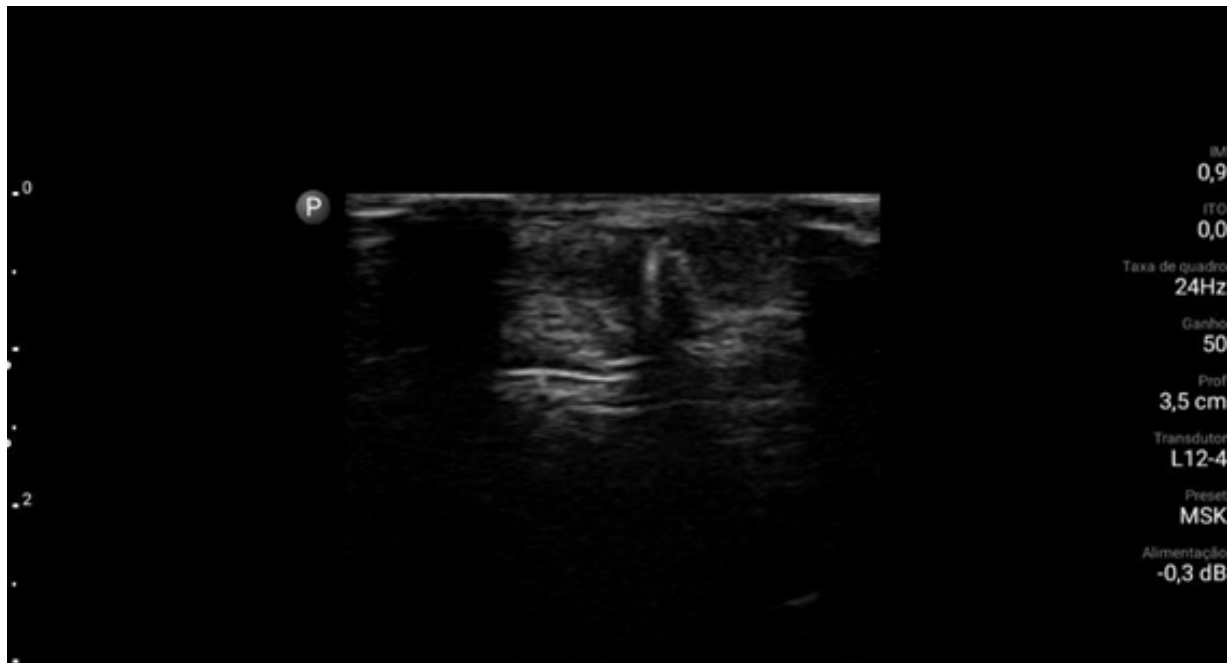


Figure 3: Ultrasound assisted surgery image.

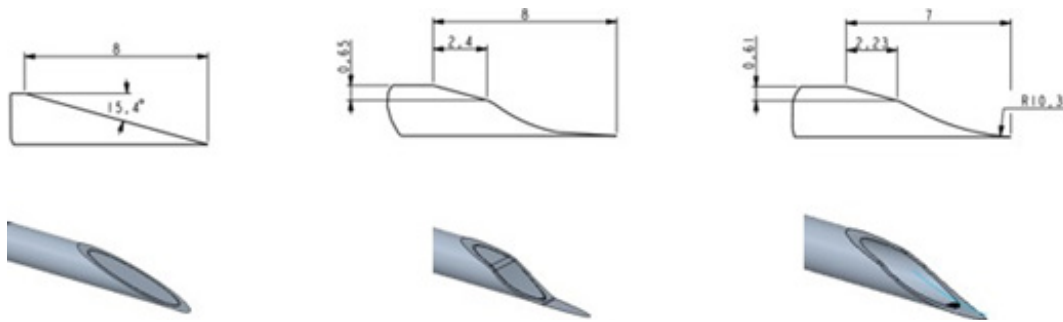


Table 1: Distribution of the pig feet and the needle used for each foot and each toe. Samples numbers in roman figures from I to IX.

	1M	1L	2M	2L	3M	3L
I	A	A	A	A	A	A
II	A	A	A	A	A	A
III	A	A	A	A	A	A
IV	B	B	B	B	B	B
V	B	B	B	B	B	B
VI	B	B	B	B	B	B
VII	C	C	C	C	C	C
VIII	C	C	C	C	C	C
IX	C	C	C	C	C	C

Needle Knife used A, B and C. medial pig toe M and lateral pig toe assessed L.

Results

Model 3 presented similar features in rigidity to the baseline model 1 (3,6%). They have a similar performance. The tip of model 3 increased a tension of 15%; but does not mean fracture risk. In ultrasonic assisted surgery in pig feet from butchery the geometry; puncture capability, cutting capability, tip deformation and tip fracture.

Geometry: Group A Control; group C and then group B

Puncture capability: Group B; Group C and then Grupo A.

Cutting ability: Group C; then A and then B. (tip of B deformation)

Resistance: Group A; then group C and then group B.

Deformation: needle B has a tip deformation in 50 % of the cases.

Two different bisel tips needle shapes were modified from the original one metal guide of an intravenous catheter in order to improve the cutting ability as well as maintain the aspiration and infusion feature. One longer surface edge and another one not so long. The longest, although supposed to be the best performer is not strong enough and deformed. The second one is the most useful for needle knife instruments.

Conclusion

These devices seem suitable for surgery interventions according to virtual analysis and ultrasound assisted surgery.

Two different bisel tips needle shapes were modified from the original one metal guide of an intravenous catheter in order to improve the cutting ability as well as maintain the aspiration and infusion feature. One longer surface edge and another one not so long. The longest, although supposed to be the best performer is not strong enough and deformed. The second one is the most useful for needle knife instruments. More clinical study is recommended [3-9].

References

1. <https://www.britannica.com › science › toe>
2. Ravaglia FFA, Cliquet Jr A (2022) Developing A Needle-Knife Surgical Device. Intern Jour psych 7(1): 14-20.
3. A. Capeletto, M. O. Lima, P. E. Bennemann (2016) Prevalência de problemas locomotores e seu efeito na longevidade de matrizes suínas Prevalence of locomotors problems and their effect on the longevity of swine matrices; Scientific Electronic Archives Issue ID: Sci. Elec. Arch. 9(5): 85-94.
4. Ravaglia FFA, Cliquet Jr A (2022) Developing and Initial Testing for an Arthroscopic Needle-Knife Surgical Device (ANKSD) Prototype. Research & Review: Journal of Medical and Health Sciences.
5. Ravaglia FFA, Cliquet Jr A (2022) Developing A Needle-Knife Surgical Device. Virtual Event - 3rd Advanced Material Science World Congress held March 21 - 23, 2022 Distinguished Speaker Oral Presentation.
6. Ravaglia, FFA; Cliquet Jr, A: Paper Number: 39394 "Comparison of two different needles used as knife on knee arthroscop-

ic portals scalpel procedures.18/09/2015 XXVI SICOT Triennial World Congress Guangzhou, China.

7. Ravaglia, FFA; Cliquet Jr, A: Arthroscopic Needle-Knife Surgical Device (ANKSD); Prague TWC 2011, 29714; CR.
8. Ravaglia, FFA; Cliquet Jr, A: Arthroscopic Needle-Knife Surgical Device (ANKSD) Prototype; OWC 2012, 33138; Dubai UAE.
9. <https://www.westfield.ma.edu> › final

Copyright: ©2022 Ravaglia FFA, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.