Does neuraxial anesthesia damage DNA as general anesthesia?

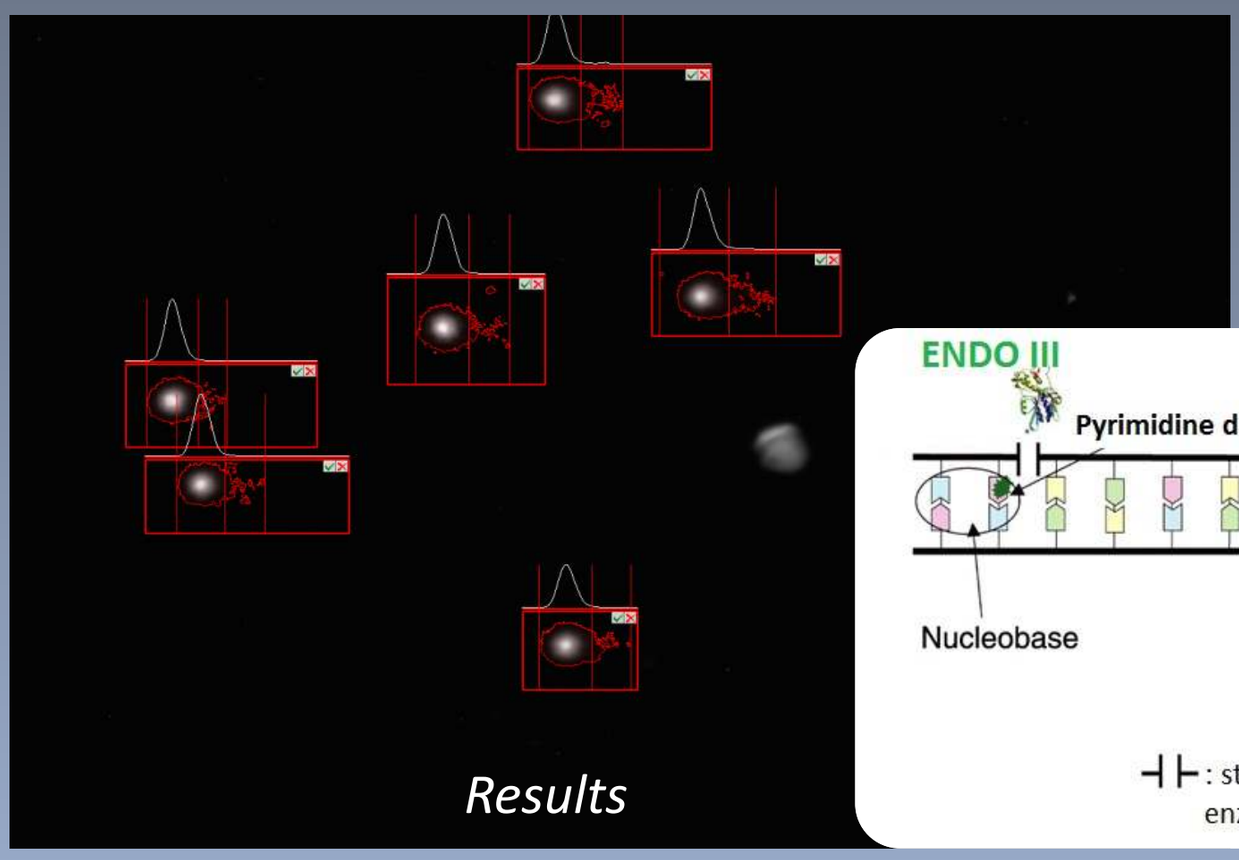
Astapenko D.[1,2,3], Koščáková M.[3,4], Zubáňová V.[3,4], Kuchařová M.[3,4], Štětina R.[3], Černý V.[2,3,5,6] and Zadák Z.[3]

1) Dept. of Anesthesiology, Resuscitation and Intensive Care Medicine, University Hospital Hradec Králové, Czech Republic
2) Faculty of Medicine in Hradec Králové, Charles University in Prague, Czech Republic
3) Centrum for Research and Developement, University Hospital Hradec Králové, Czech Republic
4) Faculty of Pharmacy in Hradec Králové, Charles University in Prague, Czech Republic
5) Dept. of Anesthesiology, Perioperative and Intensive Medicine, Masaryk Hospital in Ústí nad Labem, IPVZ, Czech Republic
6) Dept. of Anesthesia, Pain Management and Perioperative Medicine, Dalhousie University, Halifax, Canada

Background

DNA damage during general anesthesia has been well documented and it yields a significant burden to the patients, as it is iatrogenic damage. Data on neuraxial anesthesia are missing so far.

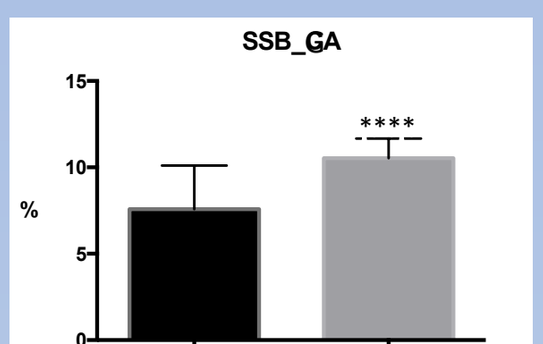
Our aim was to assess the amount of DNA damage in patients under general anesthesia (GA) and neuraxial anesthesia (NA) in a pilot study.

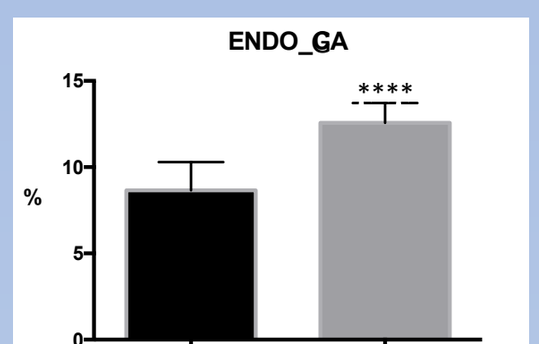


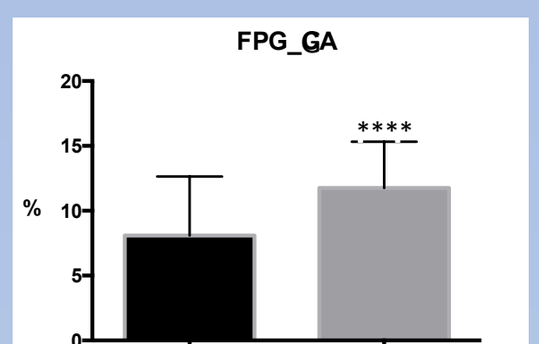
Results

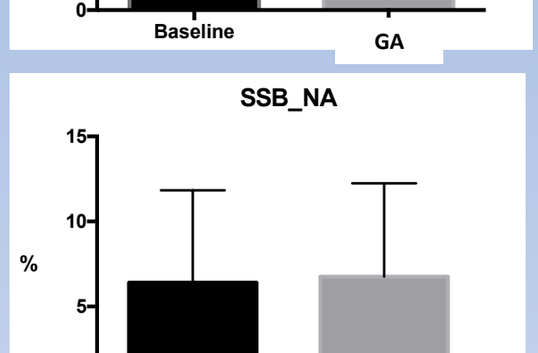
	GA	NA	p value
MAP [mm Hg]	96	94	0,47
HR [BPM]	82	74	0,03
$Sp0_2$ [%]	98	96	0,002
Hb [g/l]	116	142	0,0004
Htc [ratio]	0,33	0,42	<0,0001
Na [mmol/l]	139	140	0,53
K [mmol/l]	4,3	4,2	0,54
Cl [mmol/l]	102	104	0,27
Gly [mmol/l]	6	5,6	0,29
Duration of anesthesia [min]	199	109	0,001

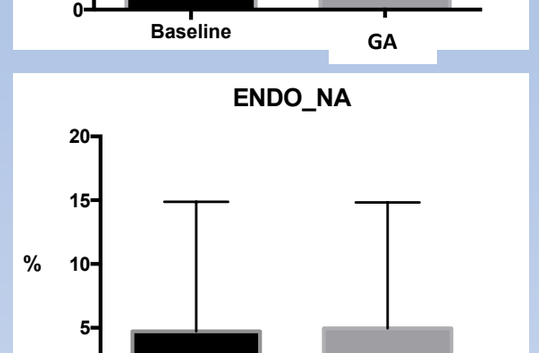
	GA	NA	p value
n	19	15	N/A
Gender			
female	9	7	0,96
male	10	8	0,96
Age	40	62	0,0002
BMI	28,4	27,6	0,64
ASA I [%]	13	21	0,55
ASA II	54	68	0,36
ASA III	27	11	0,22
ASA IV	6	0	0,25

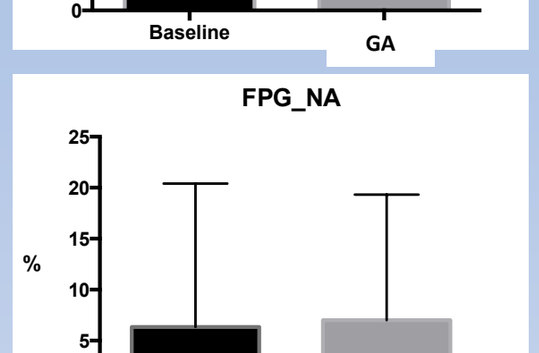












Methods

34 patients undergoing elective traumatology or orthopedic surgery on limbs and/or big joints were allocated to the GA or NA group.

Centrifuge of the blood samples with LSM to obtain lymphocytes

Resuspension in PBS to obtain concentration 10^6 cells/ml

Composition of slides with 85µl of high melting point agarose and addition of 35µl of lymphocyte suspension with 85 µl of low melting point agarose

Lysis of the cells at 4°C for 1 hour in high salt and detergent solution to obtain nuclear DNA on the agarose gel

Incubation of the DNA with specific enzymes to visualize oxidized bases

Alkali solution for 40 minutes to unwind dsDNA and cleave alkali-labile sites

Electrophoresis for 30 minutes at 4°C where DNA migrated to anode and created comets

Neutralisation, staining with ethidium bromide, semiautomatic software analysis in fluorescent microscopy

Conclusion

Our results declare that GA and X-ray significantly damages nuclear DNA, unlike NA possibly due to the lower load of genotoxic agents and blockade of afferent signals from the site of surgery in traumatological and orthopedic patients.

Supported by MH CZ - DRO (UHHK, 00179906).

Astapenko.d@seznam.cz