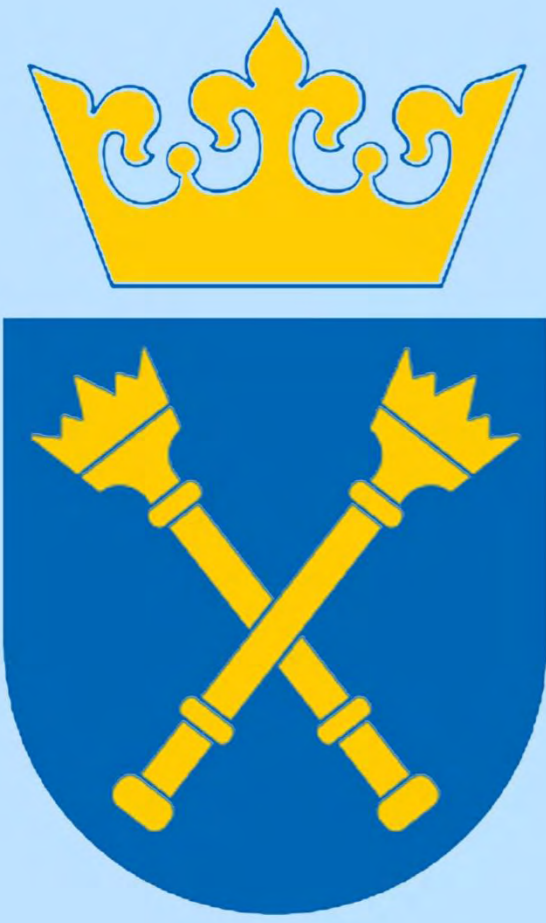


Evaluation of smear layer after preparation with PathFile rotary instruments- - *in vitro* study

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► Introduction:

The main aim of root canal treatment is to remove debris and disinfect canal system before obturation. Success of the treatment depends on many factors. One of them is the smear layer which is formed on the wall during the preparation of root canal. Smear layer is defined as a film of debris attached to dentine and other surfaces following instrumentation with rotating burs or endodontic files. Smear layer might partially or completely occlude dentinal tubules, and the bacteria, endotoxins, and debris contained within it could contribute to ongoing periapical inflammation. Moreover, as well as containing bacteria, smear layer might prevent medicaments from adequately diffusing from the root canal space into the dentinal tubules.

► Aim:

The aim of the study was to compare rotary PathFile system and conventional hand instruments in aspect of producing smear layer during root canal preparation.

► Materials and methods:

20 human teeth free of caries that have been kept in a solution of sodium chloride were used for the study.

1. Chamber of the tooth trepanation, rinsing with 2ml 5%NaOCl (for 30sec.), root canal length measuring, rinsing with 1ml 5%NaOCl (for 30sec.), beginning preparation of root canal with Kerr file instruments No.10 by ISO, beginning preparation of coronal and middle section of the root canal with Gates Glidden burs No. 3 and 5.
2. Random division into two groups:

► GROUP I Hand file preparation (in sequence reamer and Hedstrom file No. 15 and 20 by ISO)



Fig.1. SEM S-4700 (Hitachi HTA, USA)

3. Final rinsing with 5ml 5%NaOCl (for 30sec.) and 5ml NaCl.
4. Chamber dryout and tight closure with KetacCem material.
5. Cutting off the crown of the tooth at the height of amelodentinal junction.
6. Incision and split of the root.
7. Spraying the surface of sample with palladium carbon alloy.
8. Samples analysis by scanning electron microscope (SEM).
9. Thickness measurement of smear layer at the height of 4mm from root apex.
10. Evaluation of the smear layer according to Hülsmann's scoring system.
11. Statistical analysis of results.

► GROUP II Rotary Pathfile system preparation (in sequence instruments No. 13, 16, 19)



Fig.2. PathFile instruments

► Results

Sample	Group I (Hand File)	Group II (Rotary PathFile)
1	3	3
2	2	5
3	2	4
4	3	3
5	1	3
6	2	3
7	2	4
8	3	5
9	3	3

Fig. 3. Measurement of smear layer thickness in apical 4 mm of root canal applying Hülsmann scale.

► Because of procedure failures 1 sample in each group has been excluded.

► 9 samples in each group were analysed by SEM applying Hülsmann scale. (Fig. 3,4, 5)

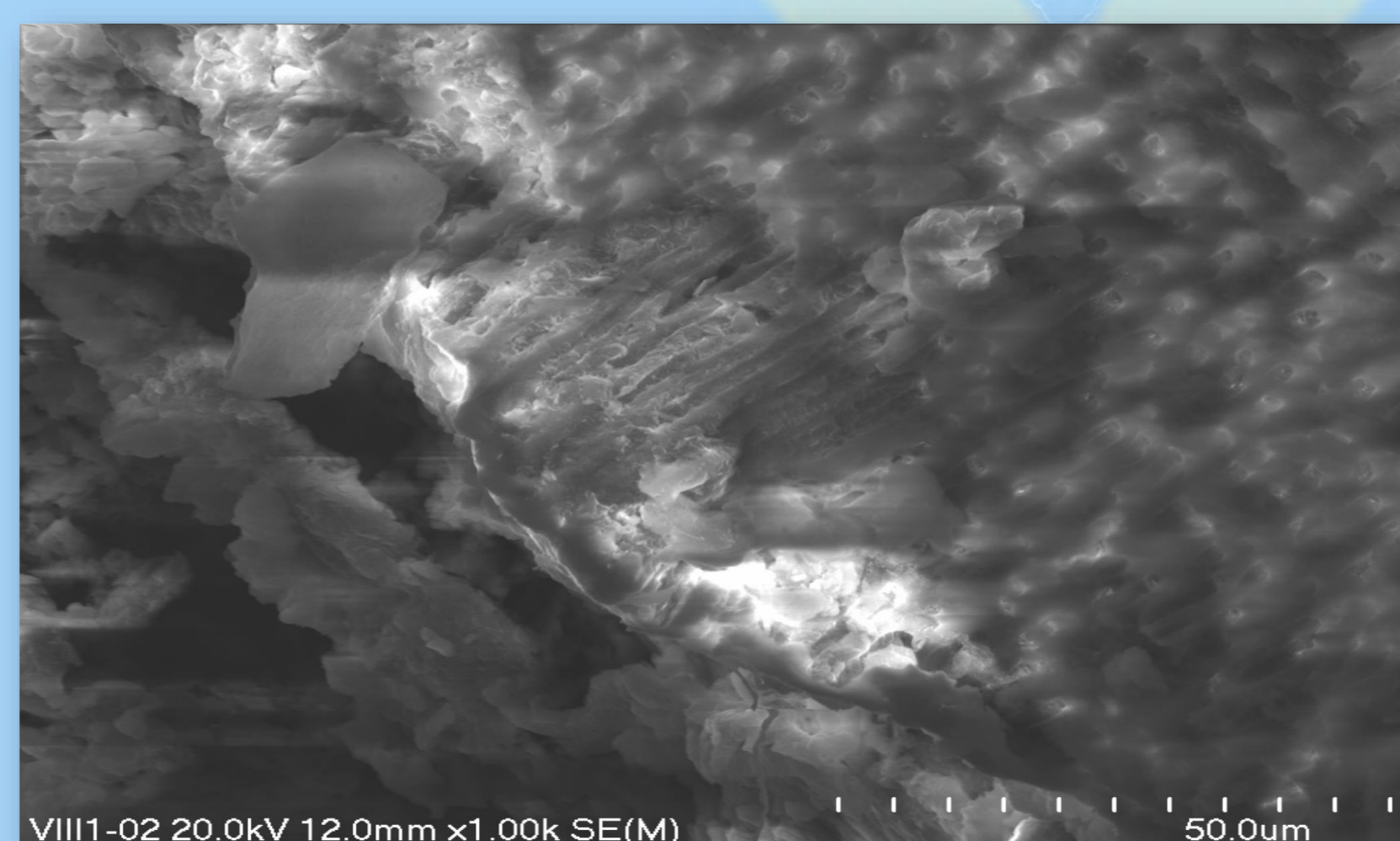


Fig. 4. SEM. Group I (Hand file) - Hülsmann scale: 2.

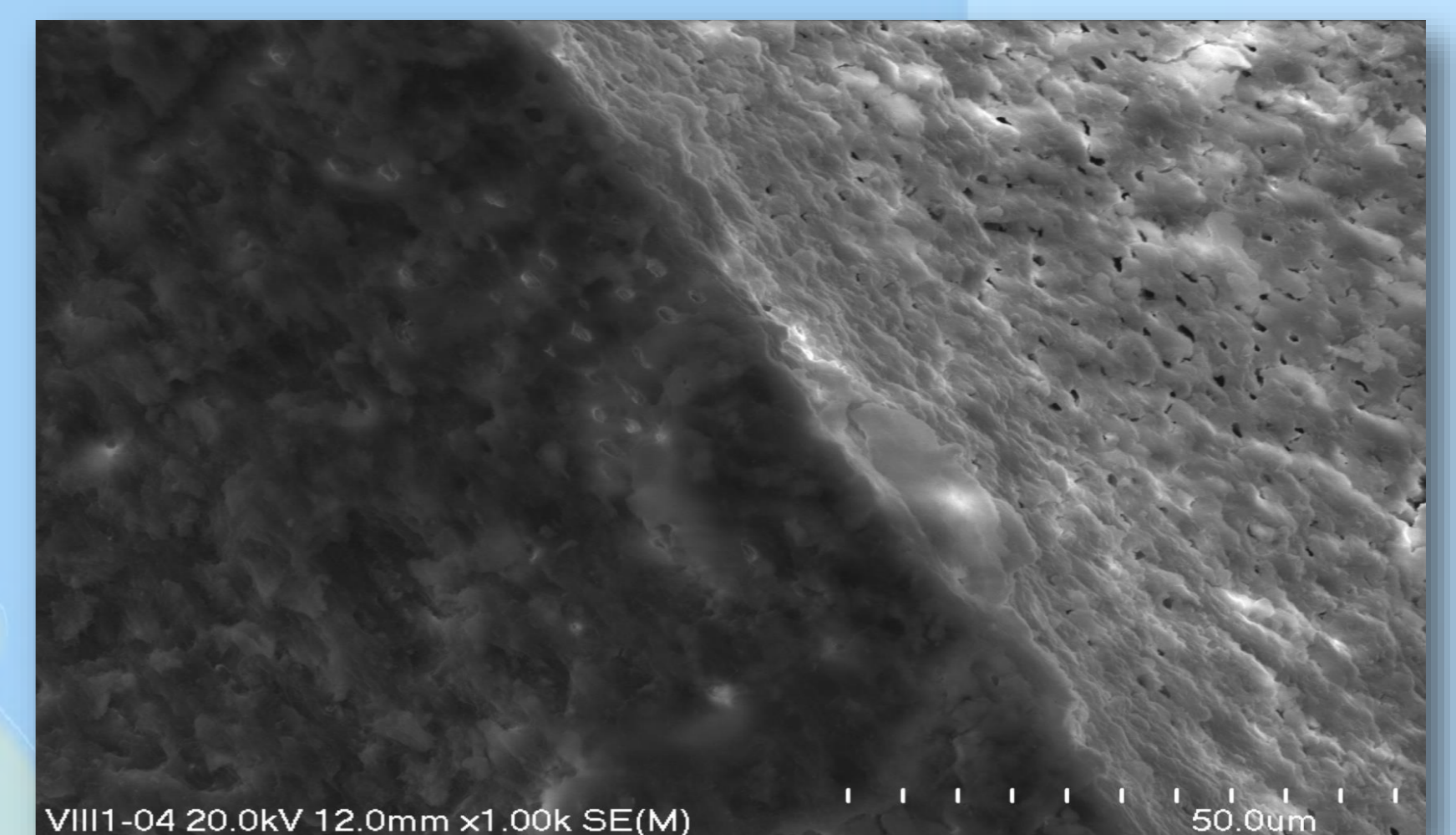


Fig. 5. SEM. Group II (Pathfile) - Hülsmann scale: 3.

► Kruskal-Wallis test revealed statistically significant differences between groups ($p=0,0258$). (Fig. 6)

Group	Mean	Median	Minimum	Maximum	Standard deviation
I	2,33	2,0	1,0	3,0	0,71
II	3,67	3,0	3,0	5,0	0,87

Fig. 6. Measurement of smear layer thickness in apical 4 mm of root canal applying Hülsmann scale.

► Conclusions:

- A study shows that both hand file and rotary file produce smear layer during preparing a root canal.
- Based on SEM data, rotary Pathfile produces more smear layer in apical part of a root canal than hand file.

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