

SUMMARY

1 PURPOSE OF THE STUDY

Heterotopic ossification is frequent and well known complication after primary total hip arthroplasty. Prophylaxis is crucial, otherwise when ossification is matured, the only treatment option is surgical removal during revision hip surgery. Prophylaxis options are pre, peri- and postoperative modalities. Effectiveness of the prophylaxis step is the aim of this dissertation.

The goal of **Study 1** was to prove the positive side effect of tranexamic acid application to reduce the heterotopic ossification ratio after elective total hip replacement.

The goal of **Study 2** was to prove the reduction in HO ratio with experimental modification of anterolateral approach with electrosurgery.

The goal of **Study 3** was to detect the knowledge among czech orthopaedic surgeons in ossification issues and compare the results of questionnaire with german results.

2 MATERIAL AND METHODS

Study 1

Cohort of 401 total hip replacements were assessed prospectively. Stratification of particular degrees in Brooker scale, sex, laterality and fixation type were evaluated. The average follow up was 6,10 year (40m to 113m). Hips from 2012 are referential and hips from 2016 are administered to tranexamic acid protocol. Other secondary prophylactic modalities (farmacoprophylaxy or radiotherapy), tertiary modalities (revision surgery) and traumatic etiology patients were excluded from the study. The acquired data were statistically assessed.

Study 2

Prospective randomised longitudinal study of 382 THRs were split into standard and experimental – electromyotomy - groups. The particular surgical modified

step of the anterolateral approach is the detachment of trochanter muscles. Minimal follow-up was one year and the statistic results were aimed on stratification, grade and risk factors of heterotopic ossification between these groups.

Study 3

Questionnaire similar to German study of Sebastian Winkler was sent to orthopaedic departments in Czech Republic. The questions were assessed to detect the knowledge and treatment options in ossification issues. The results were then compared with German ones.

3 RESULTS

Study 1

Tranexamic acid protocol significantly reduce heterotopic ossification number after primary elective total hip replacement. The overall incidence of HO is 40,6%. The difference between control group (49,7%) and experimental group (30,2%) is statistically significant. More important, the clinically relevant types (III. and IV.) were reduced also significantly (12,7% vs. 4,2%). Other associated parameters: uncemented implant, female sex and right-sided surgery have further reduced the ossifications.

Study 2

Statistical analysis were significant in Fisher exact test $p = 0,035683$ favorising the experimental group, odds ratio is 0,3878 (95% CI 0,2124 - 0,7081) and Z statistics is 3,084, $p = 0,0020$. Analysis comparing the particular Brooker grades distribution (Wilcoxon test) is also statistically significant, $p = 0,00044$, Z statistics 3,5162. Analysis comparing prosthesis (cemented, uncemented) type with ossification development in Chi-square test is statistically non-significant in cemented type 0,8389, $p = 0,359723$, significant in uncemented type 5,6055, $p = 0,017904$. Development of clinically relevant 3rd and 4th Brooker grades comparing in both groups is non-significant, $p = 0,481906$.

Study 3

The knowledge of heterotopic ossification issues is generally good and is comparable to German results. Indications for revision surgery in cases of

ossification maturation are thought important and are comparable to literature (Winkler S et al., 2015). Oral prophylaxis combined more with primary surgeries, surprisingly. Radiation is chosen only in 11% of primary surgeries and in 33% of revision surgeries.

4. DISCUSSION

Heterotopic ossification formation and maturation process is intensively scientifically focused however main biochemical pathways are still unrecognized. Therefore there is no causative treatment option nowadays. Individualisation of prophylactic treatment modalities leads to reduction in ossification development.

The prophylaxis stratification is the novel perspective regarding the time axis of the ossification development. Electromyotomy technique in primary prophylaxis, pharmacoprophylaxis, single shot after surgery radiation and tranexamic acid protocols and tertiary prophylaxis after revision surgeries are proven significantly in statistics. The results of our studies confirms the goals of this dissertation.

5 CONCLUSIONS

In theoretical part of this dissertation we summarised the literature knowledge about etiology, pathogenesis and potential modifications in process of triggering, maturation and treatment of heterotopic ossifications after total hip replacement.

We proved that one of the effective prophylactic methods is perioperative tranexamic acid intravenous administration with statistically significant reduction of this complication.

In experimental part we proved advantages of electrosurgical manipulation with hip abductors in straight stems hip replacements. The crucial is surveillance of individualised approach, assessment of risk factors, precision in surgery technique and complex perioperative care with brusque fast track rehab protocols.

Methods of primary, secondary and tertiary profylaxis are statistically effective in reduction of heterotopic ossification rates in all particular Brooker grades.

Our results show that administration of aforementioned profylaxis methods in primary, secondary and tertiary prevention is effective to reduce the ossification rates after total hip replacement on statistically significant levels