Re-analysis of 50 years data of ruptured abdominal aortic aneurysm (RAAA) repair using cumulative meta-analysis (CMA) and meta-sub-group analysis (MSA)

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Meta-analysis is a quantitative technique that is used to integrate the outcome measures of multiple independent studies addressing the same research question. This is the widely used method to handle medical data in most of the countries which are developing medicines. Also a cumulative meta-analysis (CMA) is a technique of meta-analysis that is performed first with one study, then with two studies, and so on, until all relevant studies have been included in the analysis. This is simply a mechanism for displaying a series of separate analyses in one table or plot. Also we could use this technique to display the possible impact of publication bias and identify effectiveness of a treatment at the earliest possible date in time.

The data set on RAAA analyzed by M.J Bown, et al. using meta- regression analysis (MRA) was used. Their aims were to estimate the operative mortality of RAAA repair and determine how it changes over time. The aims of this study were to apply meta-analysis technique to the real data set, how the cumulative mortality proportion varies with time using cumulative meta-analysis and how the mortality proportion varies according to sub groups of studies using meta-sub-group analysis (MSA).

Random effects model was used due to the variation between studies. According to the CMA plot (171 studies) for total mortality, cumulative effect decrease

with time. Also MRA plot shows total mortality decreases with time. This implies that there is a gradual reduction with time in total mortality of RAAA repair. Sub group meta-analysis was performed according to the study type levels such as 2b (retrospective hospital based studies), 2a (prospective hospital based studies) and 1b (retrospective community based studies). Mortality proportions (2a) and confidence intervals (2a) for total, postoperative and intra-operative mortality are 0.4985 (CI : 0.4724 to 0.5246), 0.3441 (CI : 0.2798 to 0.4114) and 0.2298 (CI : 0.1741 to 0.2907) respectively. The funnel plot for all 77 studies included in the analysis examining intra-operative mortality shows an extreme asymmetry indicating possible bias.

This paper demonstrates a gradual reduction in the operative mortality rate of RAAA repair with time. The average age of patients undergoing RAAA repair suggest that average age had increased over time. This analysis shows high total, postoperative, intra-operative mortality proportions for 2a study level. Publication bias effects are significant to intra-operative mortality proportion.

Key Words: *Cumulative meta-analysis, Meta-sub-group analysis, Meta-regression analysis, Random effects model, Funnel plot, Publication bias*