**Evaluation of Aras Jamal Talabani’s Ph.D. thesis**

**The mantle**

The mantle encompasses 80 pages and is generally well written. The thesis analyses in-hospital patients with acute diverticulitis in the catchment area of Levanger sykehus in the period from 1988- 2012 and also utilizes data from the HUNT 2 material.

The thesis is based on four articles all published in journals with an impact factor 2- 3. The mantle text starts with a comprehensive description of abbreviations and definitions. There is a short introduction giving the historical perspective then a discussion on pathogenesis with a discussion on the most common theories. This is followed by sections on epidemiology, symptomatology and treatment given in a straight forward way but not very in depth. One could wish a more critical approach with analysis of the evidence that is on the table.

The research questions in the different articles are presented and an elaborate description of the statistical methods follows. In part very advanced statistics but considering that one of the co-authors is a statistician there is no cause to doubt the soundness of the used methods. A term like incidence rate ratio is not often encountered in clinical studies but is probably most adequate in epidemiology.

The selection of patients and their appearance in the 4 articles is well defined. The size of the catchment population for Levanger sykehus during the study period is missing. The patients that were identified from the hospital registries had their diagnoses confirmed in that the their specific notes were read, however one cannot be sure that some patients were not registered with a diverticulitis diagnose and thus can have been missed. The weaknesses in diagnosing the patients are discussed adequately. There is no mentioning of how many patients that were eligible for study II. By large the meaning of the findings is somewhat scarcely discussed.

In the general discussion risk factors, long term survival and a balanced discussion on indications for surgery is given and also the limitations of the studies and possible bias.

In the conclusion all main results are summarized but no interpretation of their meaning is given, if so this would have pointed to the candidate’s scientific matureness. There is a thorough review of the literature with a reference list of 197 articles. The thesis is solid but mostly merely confirming previous knowledge. This however could not be foreseen until the work had been done.

**Specific comments on the papers:**

Paper I **Major increase in admission- and incidence rates of acute colonic diverticulitis Talabani AR, Lydersen S, Endreseth BH., Edna T-H. Int J Colorectal Dis (2014) 29:937-945.**

The article is published in a colorectal journal with an impact factor of 2.4. All patients admitted to Levanger Hopsital between 1988 and 2012 were evaluated and the cohort was identified using the ICD codes for diverticulitis. It seems as if another surgeon than Jamal Talabani performed the chart review, as it was stated that the reviewer was employed during the enitre study period between 1988 and 2012?

The diagnoses were validated, but how, when do you know that the patient has diverticular disease? It would have been interesting to have more details on this. It is impressive to have details on all these cases, but it is also difficult to do this in a retrospective cohort. This could have been discussed further. It could have been of interest to add more details on treatment as to see trends also in treatmend offered.

The results are presented in an adequately and in an orderly fashion. The gender difference seen in the material is only presented and not discussed in detail in the discussion.

The discussion is relevant but could elaborate more on the causes of an increase in admission rates. The strength of a prospective cohort for a long period of time may also be a weakness as it is likely that attitudes towards diseases and admissions change over time. Still the paper is well written and contributes with additional information regarding time trends in the treatment of diverticulitis.

Paper II **Clinical diagnostic accuracy of acute colonic divertiulitis in patients admitted with acuet abominal pain, a receiver operating characteristic curve analysis. Talabani AR, Endreseth BH., Lydersen S, Edna T-H. Int J Colorectal Dis (2017) 32:41-47.**

This article focuses on acute abdominal pain in patients admitted to the Department of Surgery at Levanger Hospital. It is published in a journal with an impact of 2.4. It includes all patients admitted between 2011 and 2014. However, not all patients could be included and unfortunately a proper screeninglog could not be obtained. An attempt to identify at least all the patients with diverticulitis was performed, and it could not be demonstrated that included patients and missed patients differed much, which supports a proper external validity.

The study identifies the known diagnostic tools and gives information on their accuracy. It is possible that the study would have been even more interesting if some kind of new diagnostic tool would have been tested against the standard tools, but the study is still giving information on the accuracy of tools used in the clinic on a regular basis.

In table 1 it would have been preferable to have the numbers instead of percentages as the numbers ar small, but it is still possible to decipher. It is a pity that the material is too small to enable for a discrimination of the different types of diverticulitis with different tools, which would have been interesting.

The use of CRP as a discriminative tool between diverticulitis and other acute abdominal conditions is interesting.

The discussion is well written and highlights both strengths and weaknesses properly.

Paper III **Risk factors of admission for acute colonic divericulitis in a population-based cohort study: The North Trondelag Health Study, Norway. Talabani AJ, Lydersen S, Endreseth BH, Edna T-H. World Journal of gastroenterology 2016; 22(48): 10663-10672**

This is an open access article that aims to study the risk factors for being admitted to hospital with an acute diverticulitis. The background population is taken from the HUNT2 cohort of 43000 people. It was found that increasing age, obesity and being male living in rural areas were significant risk factors. The HUNT cohorts are extensively used for research. The patient selection is well defines in a flow chart. However there is no account of eligible people belonging to Levanger Hospital that did not accept to participate in the HUNT study. 92.5 of the 358 patients that were admitted had their diagnosis confirmed by imaging. The Hunt cohort was recruited from 1995 -1997 but in this study only patients diagnosed from 1988 and onwards were included, so there might be some of the early patients in the HUNT cohort that are missing. Obviously the data collected in the HUNT population was not primarily designed to study risk factors for acute diverticulitis and this is a drawback. Constipation is a word that people interpret individually for some it is outlet obstruction and for others slow transit. Is type of bread a good indicator of fiber intake? One can think of other variables of interest that was not studied and that might if they were included have changed the picture. The data on possible risk factors were collected mean 9 – 10 years before the admission so we do not know how these patients had behaved during the 10 years preceding their hospitalization. Some of the results seems to be by chance although they are not sorted out in the multivariable analysis, why is slight breathlessness worse than very much? Why is smoking only a risk in women? Others factors may be more by association than causative, why is men living in rural areas more at risk than women? The authors discuss risk factors but do not attempt to explain the differences mentioned above. However the discussion is relevant and points to the different biological mechanisms and also discusses the strengths and weaknesses of the study.

Paper IV Survival **after acute colonic divericulitis treated in hospital. Edna T-H, Talabani AJ, Lydersen S, Endreseth BH. International Journal of Colorectal Disease 2014; 29(11):1361-1367**

This article has the aim to study short and long-term survival as well as cause of death in patients treated in hospital for acute diverticulitis. The study spans 25 years and include 650 patients admitted to Levanger Hospital. The majority had only one admission but some were admitted up to ten times. The authors are commended in that they have such complete data over this long time span with ASA scores, Hinchey grading etc. for all patients. Causes of death were collected from patient’s records or the death registry, one can discuss how accurate these are, and presumably few patients were examined with an autopsy. As expected the first admission was the one that carried most complications and death. Of those who had surgery this was also at their first admission. The operative methods used were those one can expect however it seems relatively few had radiologically guided abscess drainage. It could be noted that 100 day mortality was about the same irrespectively of whether the patient was admitted with obstruction, abscess or purulent peritonitis. The death rates were I line with those reported elsewhere. Those who died did so mainly from cardiovascular disease and one could speculate if the diverticulitis was a contributing factor however this is not discussed. Long-term survival was not dependent on type of primary disease presentation but those with comorbidity was of course at higher risk. Interestingly death from chronic obstructive pulmonary disease was more frequent among those who had had diverticulitis

**In Conclusion**

The thesis is scientifically sound and represents an amount of work well within the scope of the requirements for a Ph.D. There are unfortunately not too many new findings so it is mostly confirmative.

**Recommendation**

The candidates work is worthy to defend for the degree of Ph.D.

September 18th 2017

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