



Copenhagen CSF Study Group

Forty Years of Shunt Surgery at Rigshospitalet, Denmark:

a retrospective study comparing past and present rates and causes of revision and infection

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Introduction

Background

- Shunt surgery remains the treatment of choice for most hydrocephalic patients.
- Due to the high incidence of hydrocephalus and a high rate of complications, shunt surgery constitutes a significant medical and economic burden.
- Therefore, it is a proclaimed goal to reduce the incidence of shunt revisions.

Objective

- To **review our experience of shunt surgery over the last 40 years**; more specifically, whether there has been a development in:
 - **Rate of revision**
 - **Shunt survival**
 - **Rate of infection**



Methods

- In the 1990s Borgbjerg et al. published three papers dealing with shunt surgery at our department from 1958 to 1989.
- To investigate the development we designed a similar retrospective study including patients from 2010 to 2012.
- Inclusion criteria – ***virgin shunt insertion in study period*** – and other definitions were to a large extent adapted from Borgbjerg et al. to ease the process of comparison.

Statistics: In addition to the analysis of data from the new study period, a statistical analysis testing pairwise risk difference ($p \leq 0.05$ as level of significance) of any development since Borgbjerg et al. was performed.

	Borgbjerg et al.	Månsson et al.
Period	1958-1989 (32yr)	2010-2012 (3yr)
Patients, n	884	434
Patients \geq 15 yr	50%	90%
High Risk Diagnoses	38%	7%

Characteristics of studies from our department



Results – No Decrease in Rate of Revision

- During the follow-up period 185 (42.6%) patients had at least one revision defined as the ***first shunt failure needing surgical intervention***.
- The apparent decrease in revision rate was not statistical significant (p= 0.06).
- Changed shunt demographics (not shown) with fewer children and fewer high risk diagnoses in our study may have caused a reduction itself.

	Borgbjerg et al.	Månsson et al.
Period	1958-1989 (32yr)	2010-2012 (3yr)
Patients, n	884	434
Patients Revised	427	185
Rate of Revision	48.3%	42.6%
Risk Difference %, CI	-5.7% (-11.5;0.20), p= 0.06	

Data used in the analysis of revisions. No convincing improvement was found regarding the revision rate.

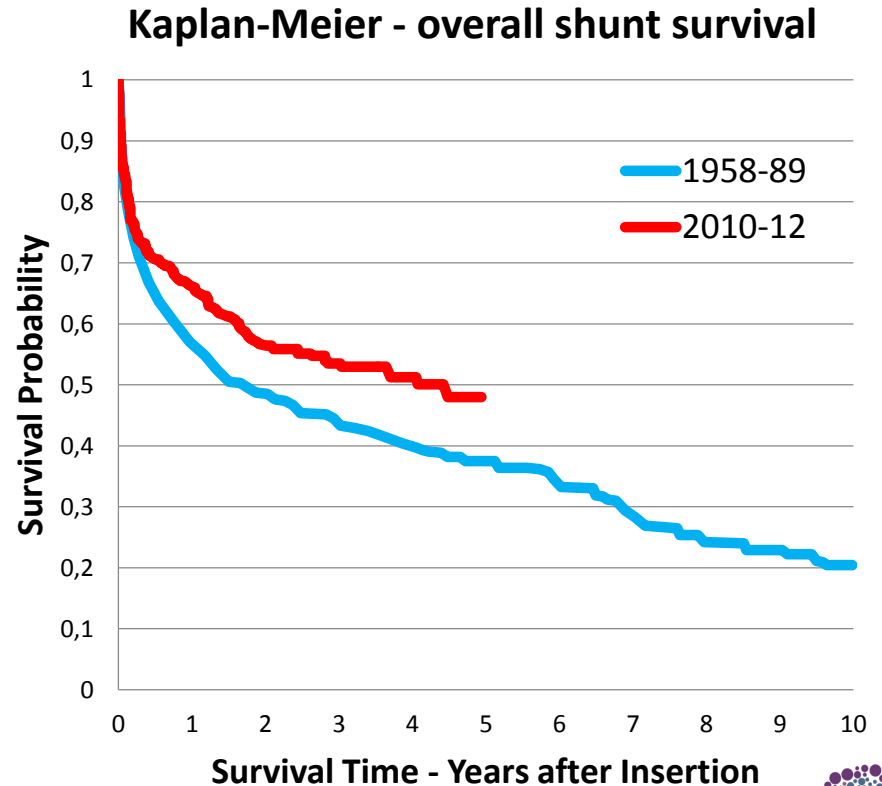


Results – Shunt Survival

- The Kaplan-Meier method of survival analysis was used to determine shunt survival time.
- Due to the lack of raw data from the previous study a statistical test for difference was not performed.

	Borgbjerg et al.	Månsson et al.
Mean Survival Time, yr (CI)	N/A	2.88 yr (2.66-3.10)
1 Yr Survival, % (CI)	57 % (53-61)	66 % (62-71)
5 Yr Survival, % (CI)	37 % (32-42)	48 % (41-55)

Survival Time = time from virgin shunt insertion to first revision. **After 5 yrs the 95% confidence intervals for survival probability are overlapping.**



Results – No Decrease in Rate of Infection

- In our study, 14 (3.2%) patients had an acute infection and overall 24 (5.5%) patients had an infection.
- The decrease in acute infections 6.1%→3.2%(p=0.04, not shown) may be influenced by implementing antibiotic prophylaxis as standard regimen.
- Overall infection rate had not decreased significantly (p=0.26)

	Borgbjerg et al.	Månsson et al.
	1958-1989 (32yr)	2010-2012 (3yr)
Patients, n	884	434
Rate of acute infection	6.1%	3.2%
Rate of infection	7.4%	5.5%
Risk Difference % %, CI	-1.8% (-4.7;1.1), p= 0.26	

Acute infection = infection within 4 weeks postoperatively. No convincing improvement was found regarding overall infection rate.



Conclusion

- Regardless of changes in patient demographics, techniques, and equipment, **risk of revision and infection still constitutes a major challenge in shunt surgery.**
- The absence of convincing improvements calls for more studies concerning strategies to reduce shunt complications.

