Very long-term outcomes of repaired and unrepaired rupturecd cerebral aneurysms in elderly people aged above 70 years of age

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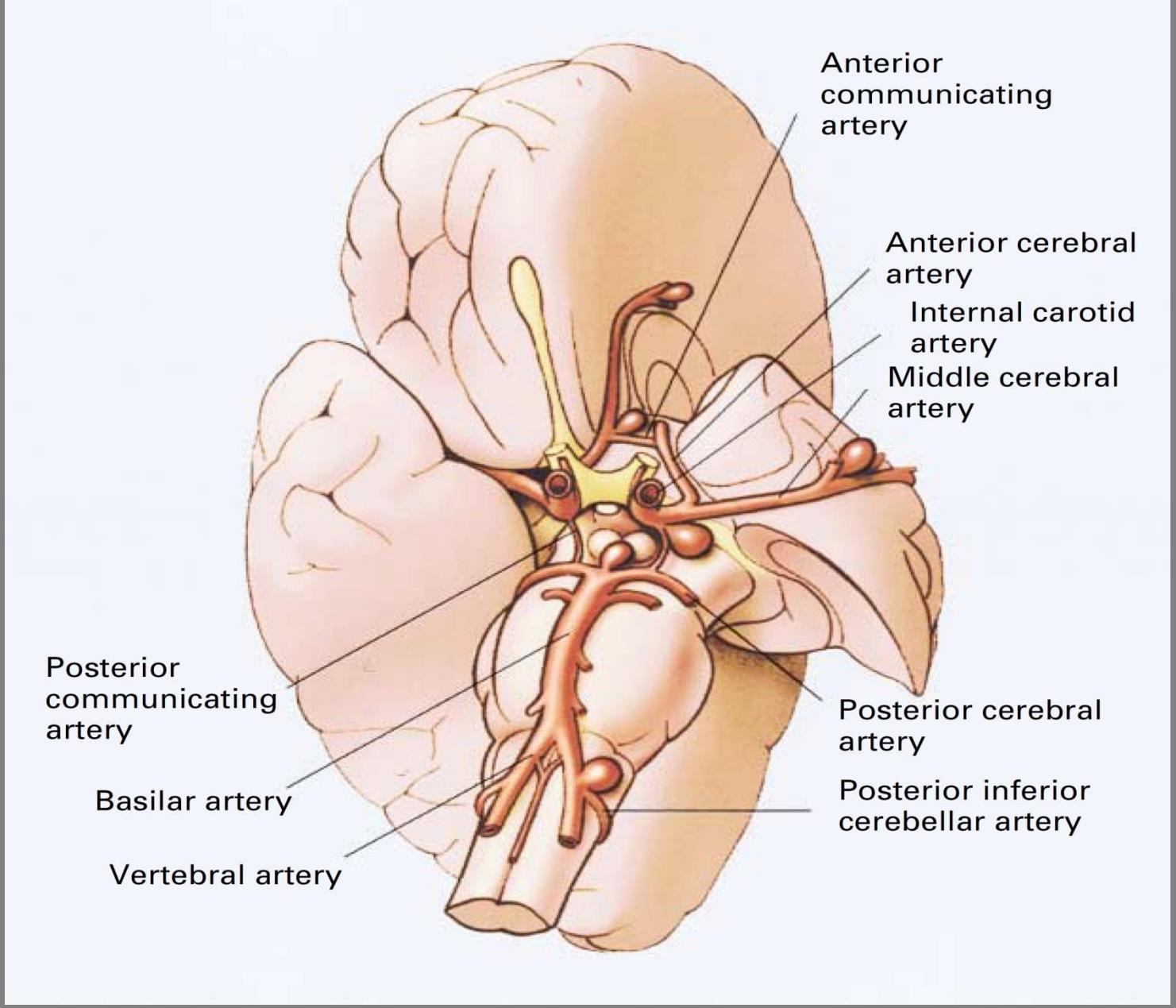
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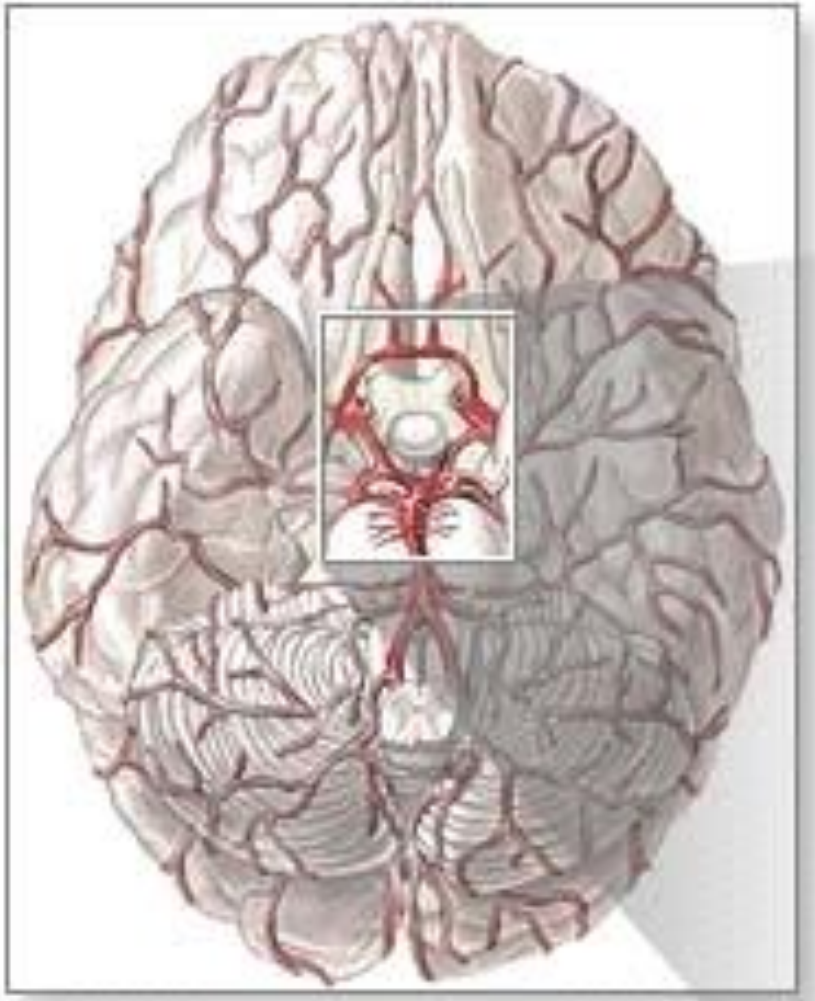
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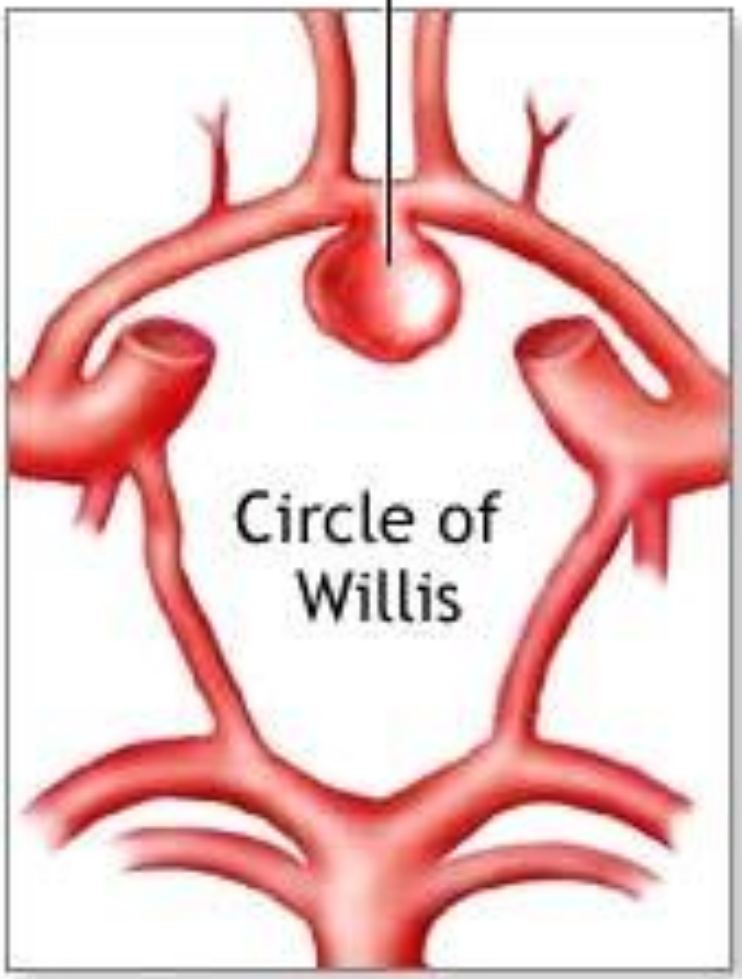
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Bottom view of brain and major arteries of the brain

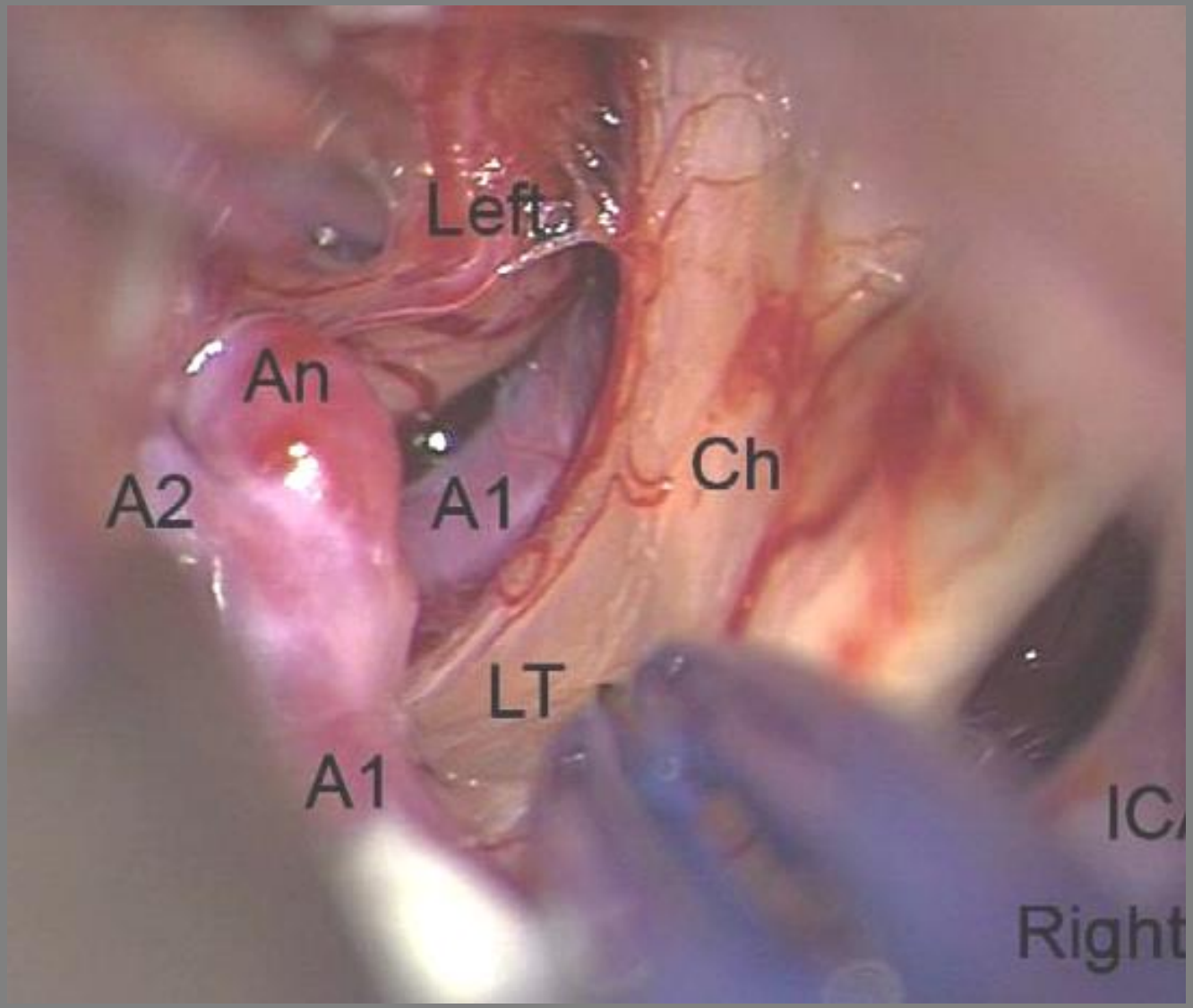
Berry aneurysm on the anterior communicating artery of the brain





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People aged > 70 years, knowledge and presumptions

Life expectancy [1] is increasing in industrialized countries, due, largely, to improvements in old-age survival.

With the ageing of the population, the number of patients with SAH increases.

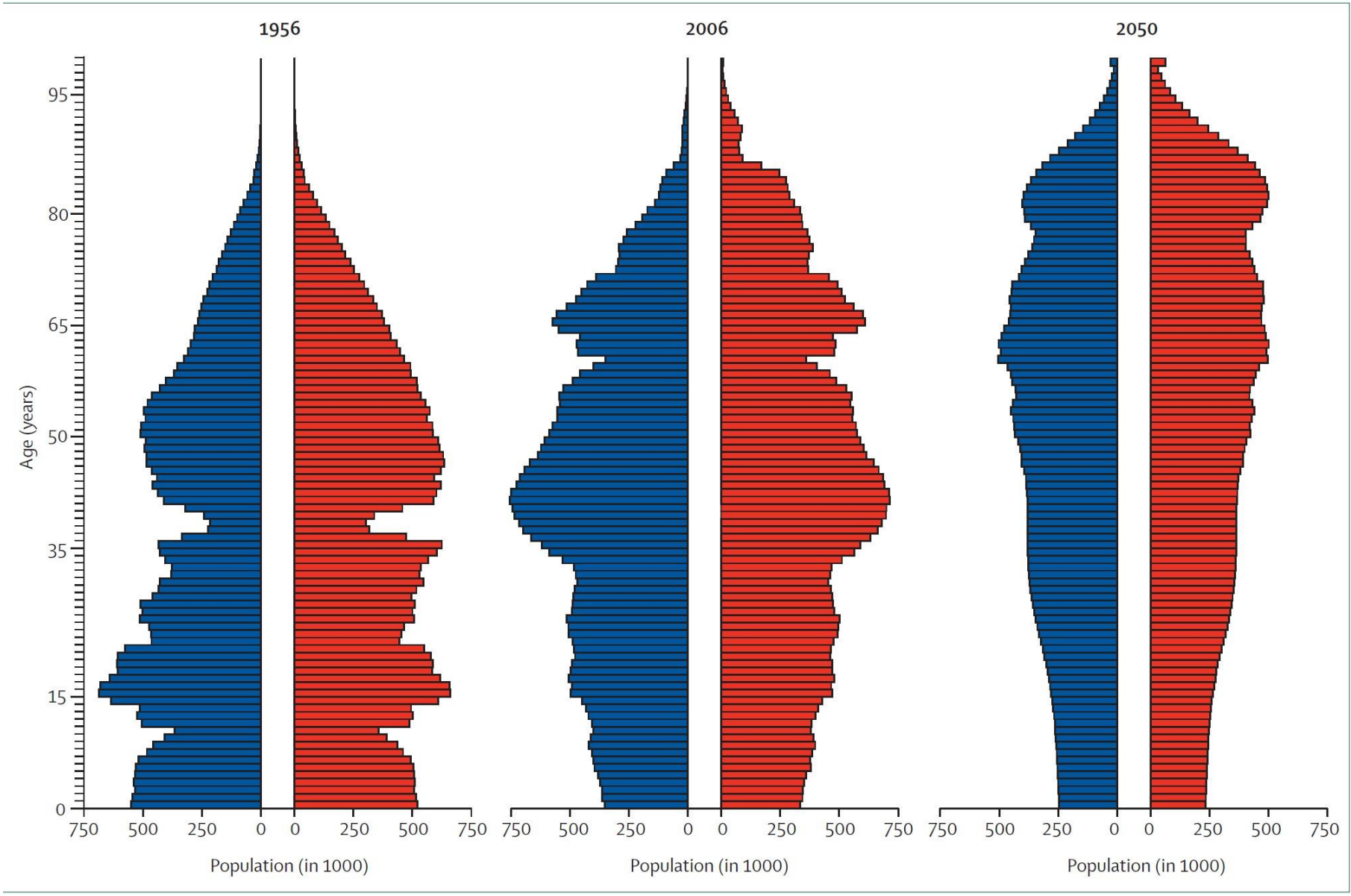
Case-fatality rates from aneurysmal subarachnoid hemorrhage (aSAH) seem to be decreasing.

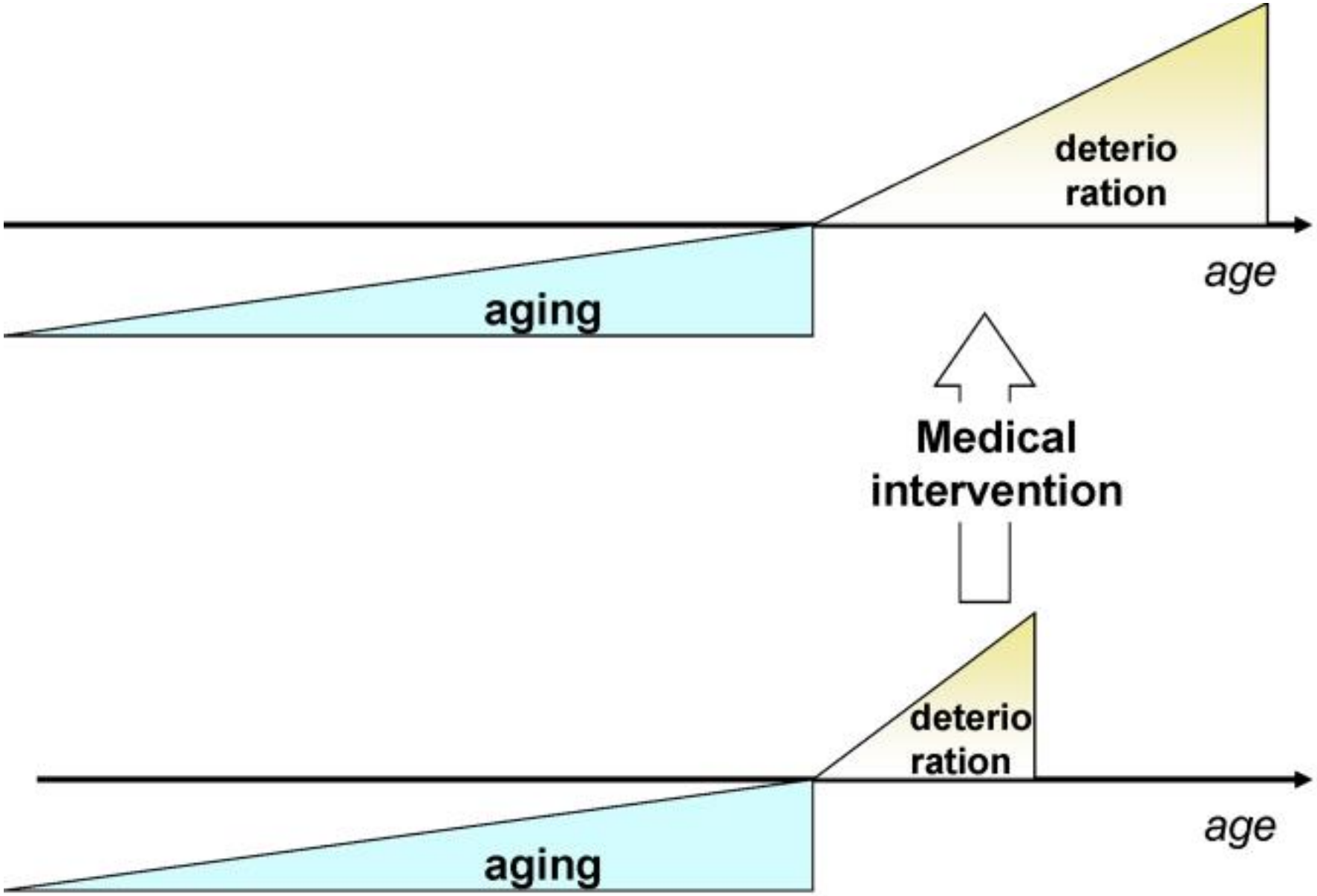
The incidence of aSAH also seems to decrease, except in older population segments.

[1] *Life expectancy: the estimated mean age at death under current mortality conditions.*

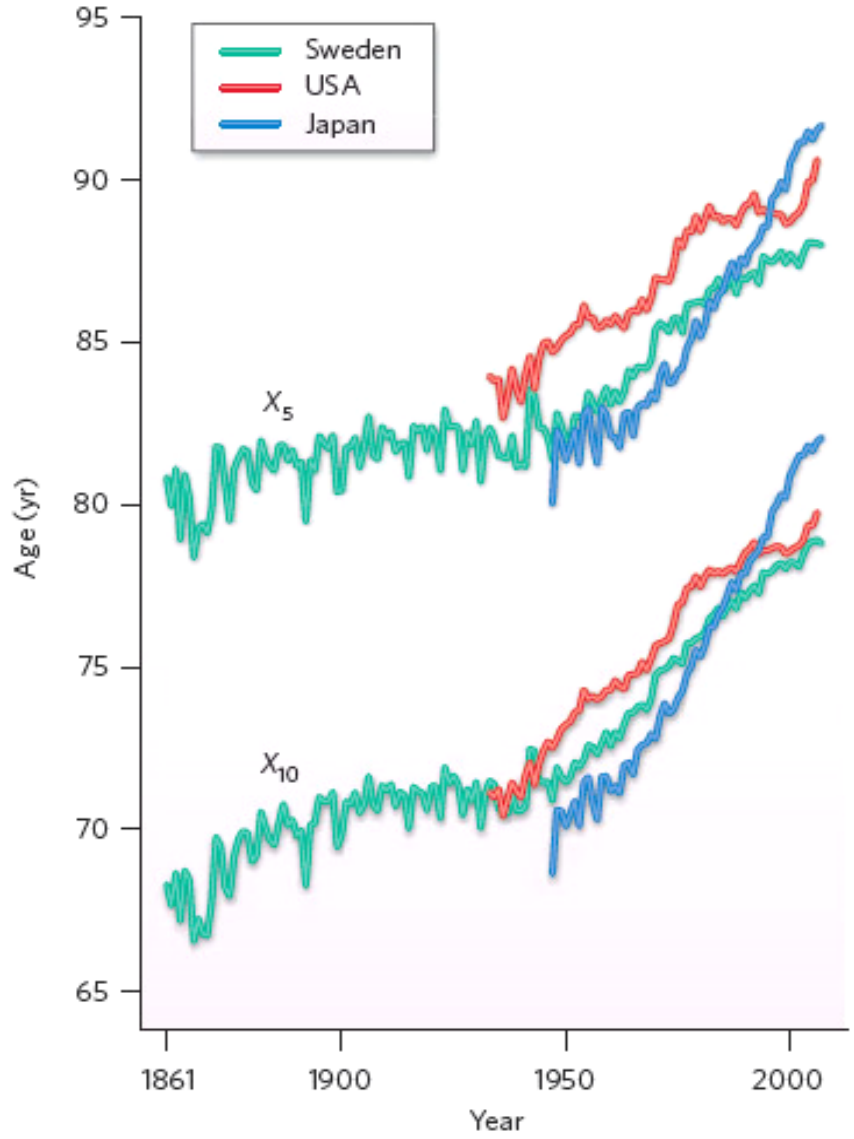
Table 1 Changes in crude incidence rates of aneurysmal subarachnoid hemorrhage in Norway from the period 1999–2001 to 2005–2007, by age group,

	1999–2001	95% CI	2005–2007	95% CI	Percentage change
Overall	11.10	10.50–11.60	8.90	8.40–9.50	−20
Age (years)					
<30	1.02	0.75–1.29	0.72	0.49–0.95	−29
30–39	7.67	6.47–8.87	4.14	3.26–5.01	−46
40–49	14.26	12.54–15.97	11.36	9.87–12.85	−20
50–59	24.09	21.70–26.49	17.62	15.68–19.56	−27
60–69	24.58	21.59–27.57	21.46	18.89–24.02	−13
70–79	23.23	20.19–26.27	20.70	17.68–23.72	−11
≥80	19.81	16.17–23.47	22.10	18.47–25.72	+12

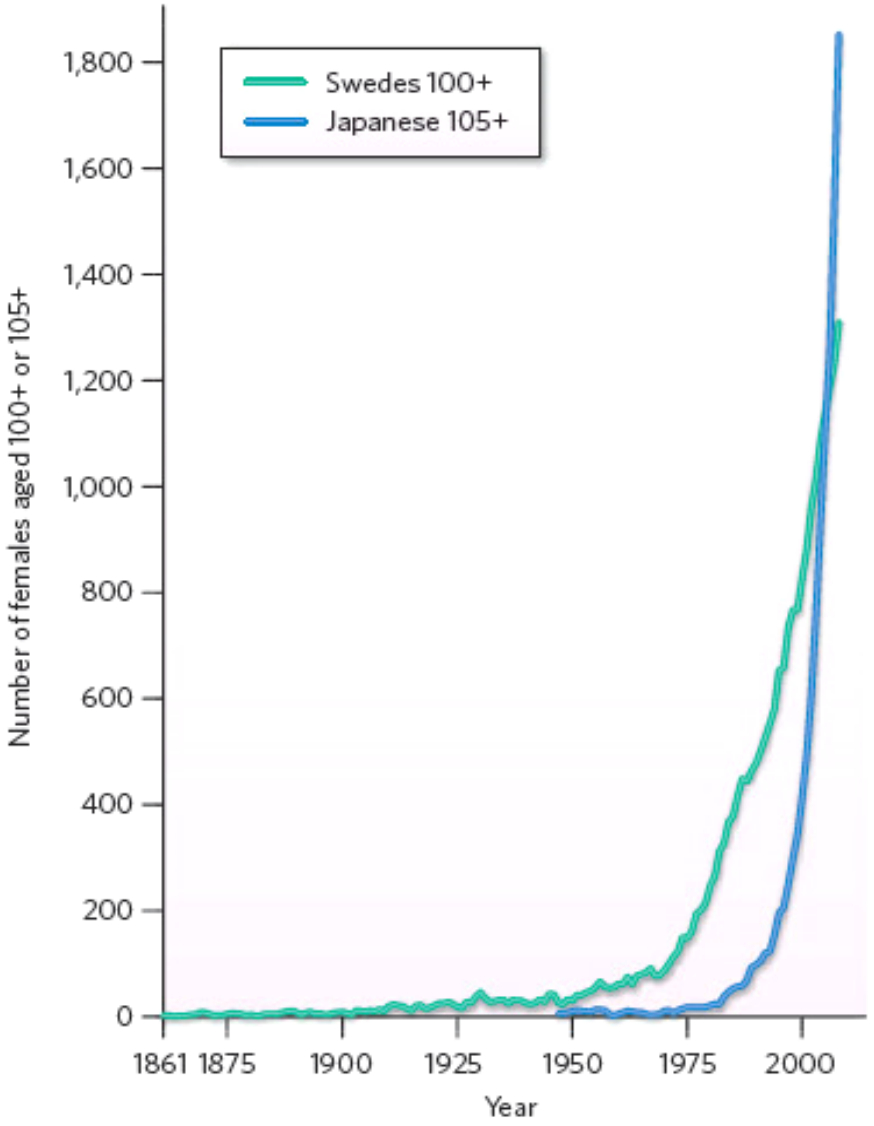

1956
2006
2050
Age (years)
0
15
35
50
65
80
95
750
500
250
0
0
250
500
750
Population (in 1000)
Population (in 1000)
Population (in 1000)


deterio
ration
age
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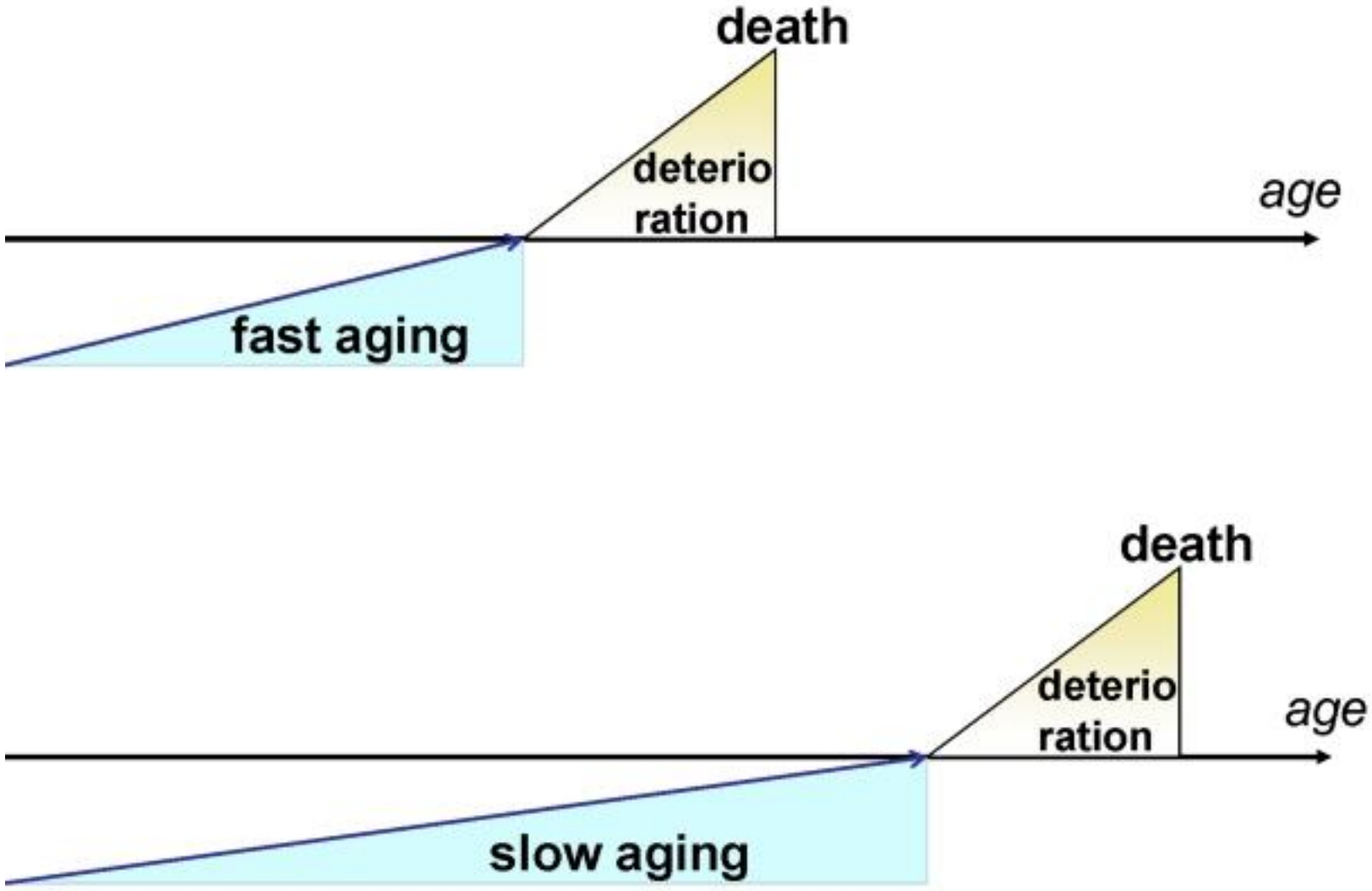
Postponement of mortality; The emergence of the centennarians



| The postponement of mortality. Historical trends in X_5 and



2 | The emergence of the extremely old. The numbers of female


death
deterio
ration
age
fast aging
death
deterio
ration
age
slow aging

People aged > 70 years with aneurysmal SAH

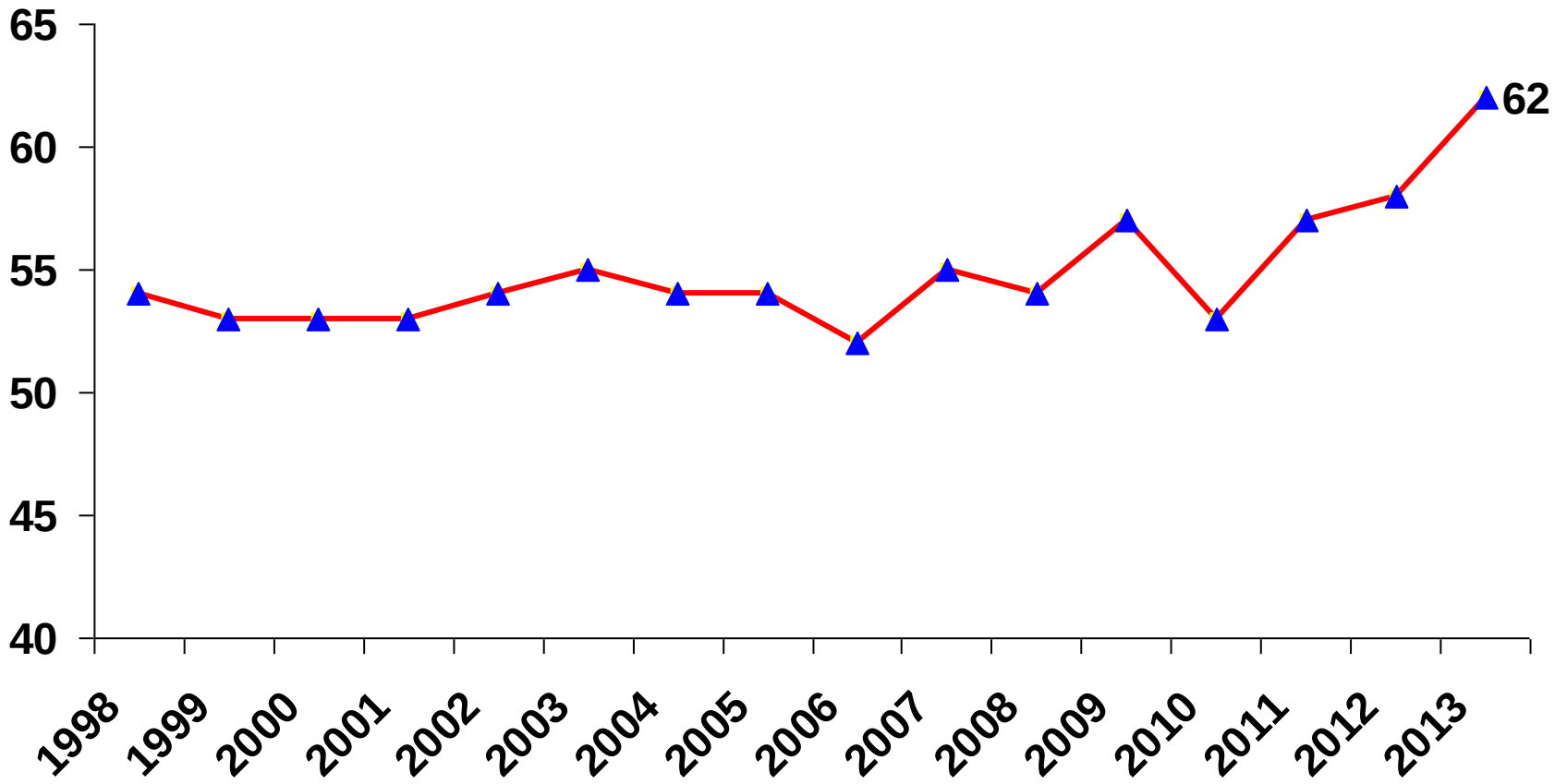
Medicina vita prolongat …

Most studies concluding that age alone should not preclude aneurysm repair in fact performed coiling or clipping in all (treatable) patients with SAH.

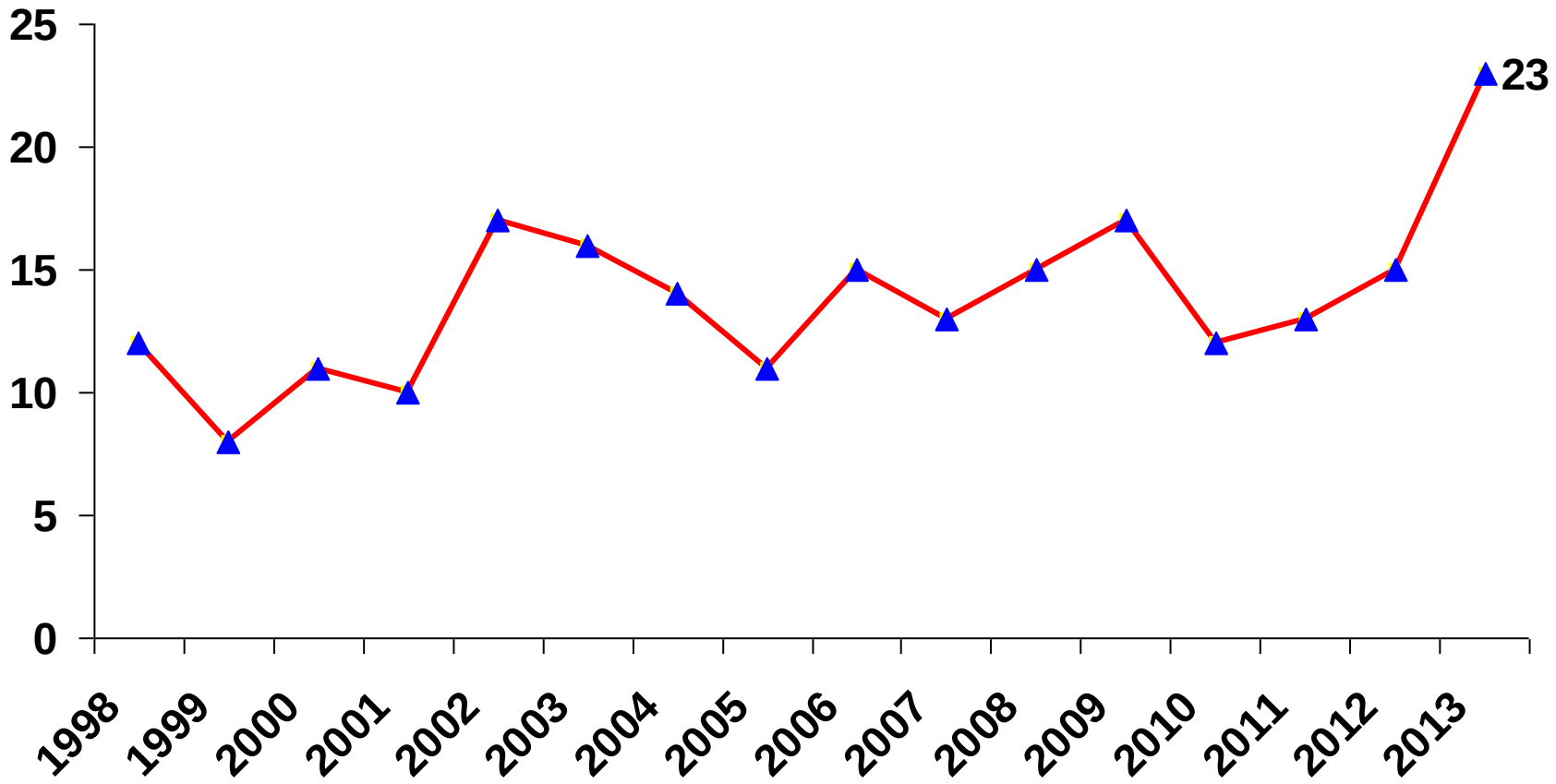
However, the favourable outcomes in such patients were never compared directly with outcomes of patients **suitable for occlusion** but who nevertheless were managed **conservatively**, i.e. non-surgical treatment.

<u>The present study tries to answer that question.</u>

Median age, all patients with aneurysmal SAH admitted1998-2013, Oslo University Hospital, Oslo, Norway



Percentage of all aSAH patients aged ≥70 years 1998--2013 Oslo University Hospital, Oslo, Norway



Hospital cohort

Third-line university hospital, “catchment area” about 1.8 mill

- All individuals aged ≥ 70 years with SAH from ruptured aneurysm admitted between Jan 1, 1996 and Dec 31, 2004.

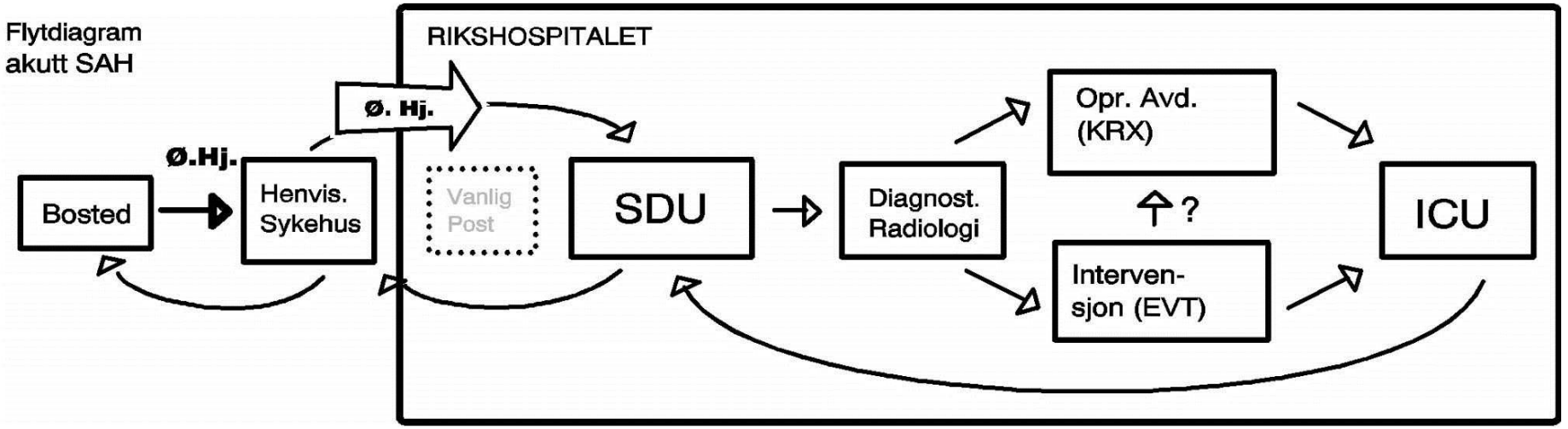
- **N = 123** Age: mean 74.7 years,
  median 74.3 years (IQR: 72.0 - 76.8)

- Females: 86 /123 = 70 % with median age 74.4 years

Non-surgical management in 27 patients

Notes on management decisions and indications for surgery were gleaned from the individual medical records in order to establish retrospectively the selected manageent strategy, i.e. why conservative, non-surgical management was chosen.

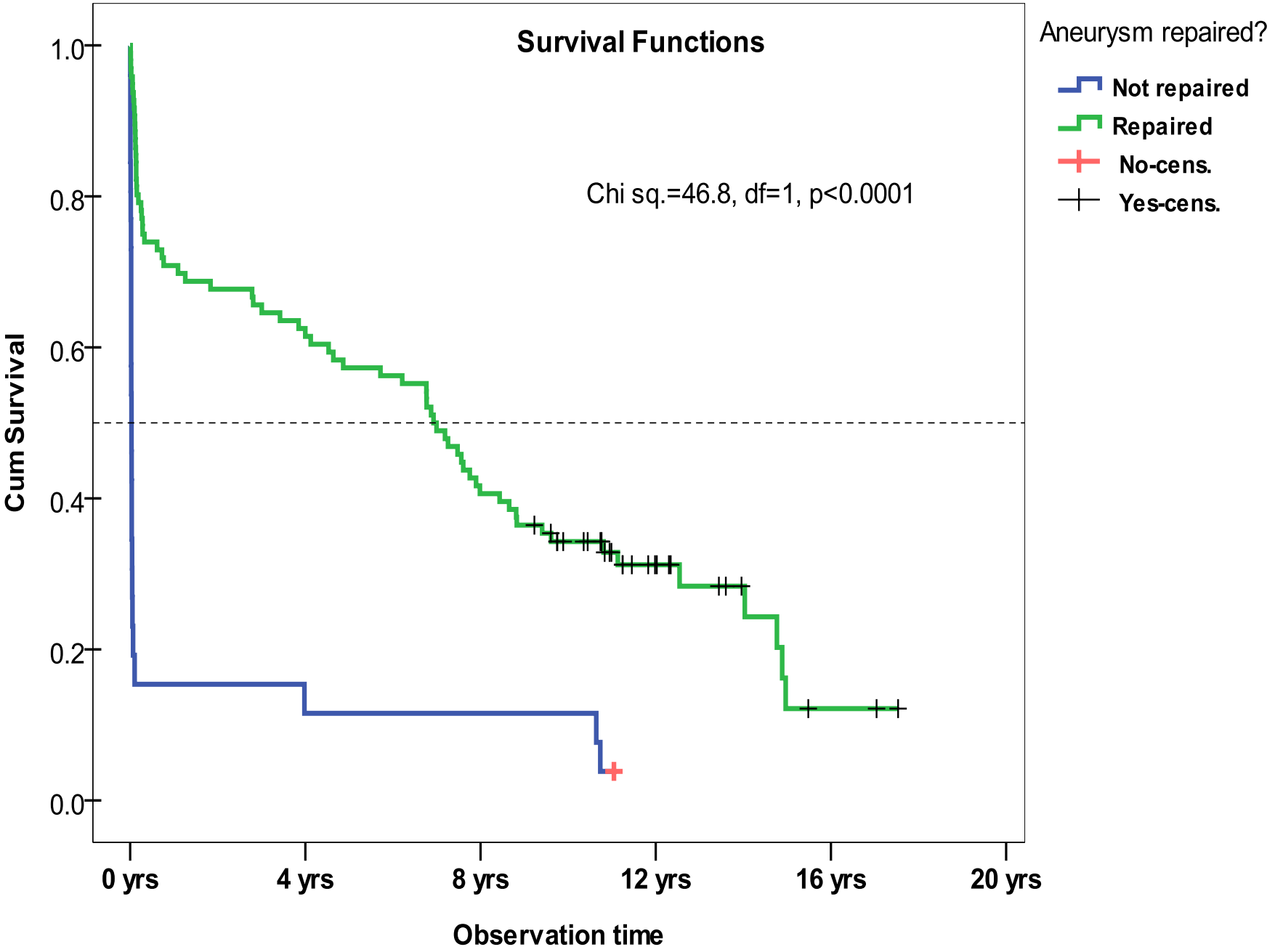
Management flowchart for patients with acute aneurysmal SAH



Design: Retrospective Observational Consecutive

- Data sources:
  - Medical records and radiographic films
  - Vital status: Norwegian Population Registry, Sept 30, 2014

- Functional outcome - <u>the individual's subjective assessment</u>
  - Health status questionnaires sent by mail median 30 months after SAH to all 67 survivors fluent in the Norwegian.
  - Return rate 61/67 (91%) - "good"


Survival Functions
Chi sq.=46.8, df=1, p<0.0001
Aneurysm repaired?
Not repaired
Repaired
No-cens.
Yes-cens.
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
0 yrs
4 yrs
8 yrs
12 yrs
16 yrs
20 yrs
Observation time

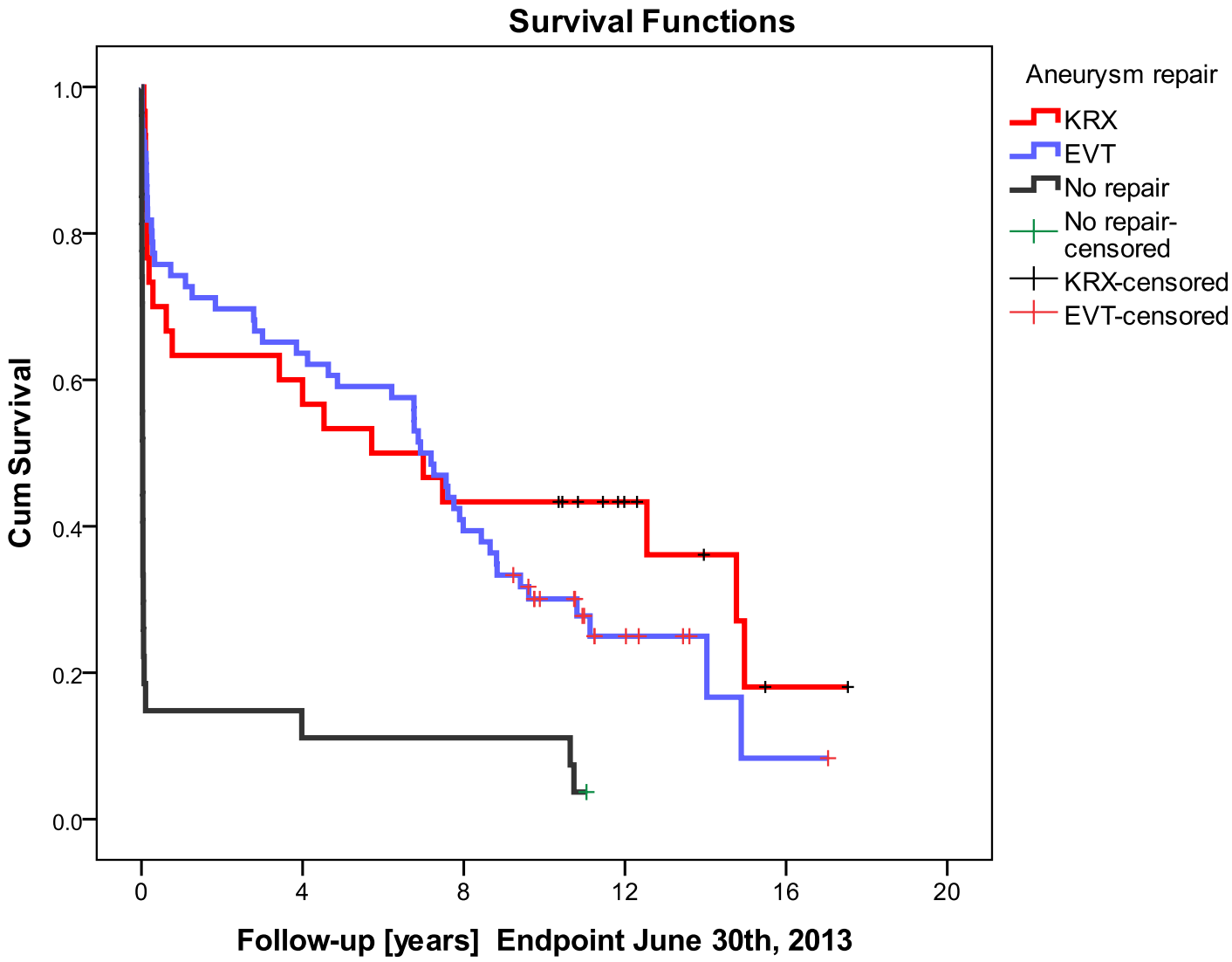
Overall management in 123 patients aged > 70 years; 1996-2004

Aneurysm in Px aged > 70 yrs - Repair intended versus Repair performed

Count

		Repair performed			Total
		No repair	KRX	EVT	
Repair intended	No repair	22	0	0	22
	Microsurgery	0	17	0	17
	Endovascular	5	13	66	84
Total		27	30	66	123

Survival in 123 Px aged > 70 years with recent aSAH



Non-surgical management in 27 patients

Management of patients aged >70 years with aneurysmal SAH

Count

		Reasons for non-surgical management in 27 patients					
		Advanced age	Poor condition	Technical	Rebleed	Refused operation	Total
Gender	Female	11	6	2	1	0	20
	Male	3	1	1	1	1	7
Total		14	7	3	2	1	27

Results from questionnaires n=61

Mobility

Can use public transport without a companion 63 %

Physical outcome:

mRS = 0-2 (favourable) 72 %

Activities of daily life (ADL)

Barthel Index =100 62 %

Barthel Index = 70-95 85 %

“Simple questions”:

Perception of full recovery 47 %

Needed no help last week 45 %

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SF-36 Heath status (HR-QoL) questionnaire

SF-36 Health perception (item sf01):

“Excellent”; “very good” or “good” 75 %

Patients’ scores compared with scores from Norwegian background population (peers) normalized for age and gender

PF physical function: equal to or better than in peers 72 %

SF social function: equal to or better than in peers 64 %

MH mental health: equal to or better than in peers 57 %

GH general health equal to or better than in peers 43 %

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People aged > 70 years with aneurysmal SAH

Survivors seemed to have had a good functional outcome or HR-QoL.

We compared outcomes in Px admitted in Good condition (WFNS 1-3) and having aneurysm repair

with outcomes of patients in a similar condition, i.e. **suitable for occlusion** but managed non-surgically.

Px admitted in WFNS Grades 1-3 after SAH

No significant differences between the surgical an the non-surgical groups

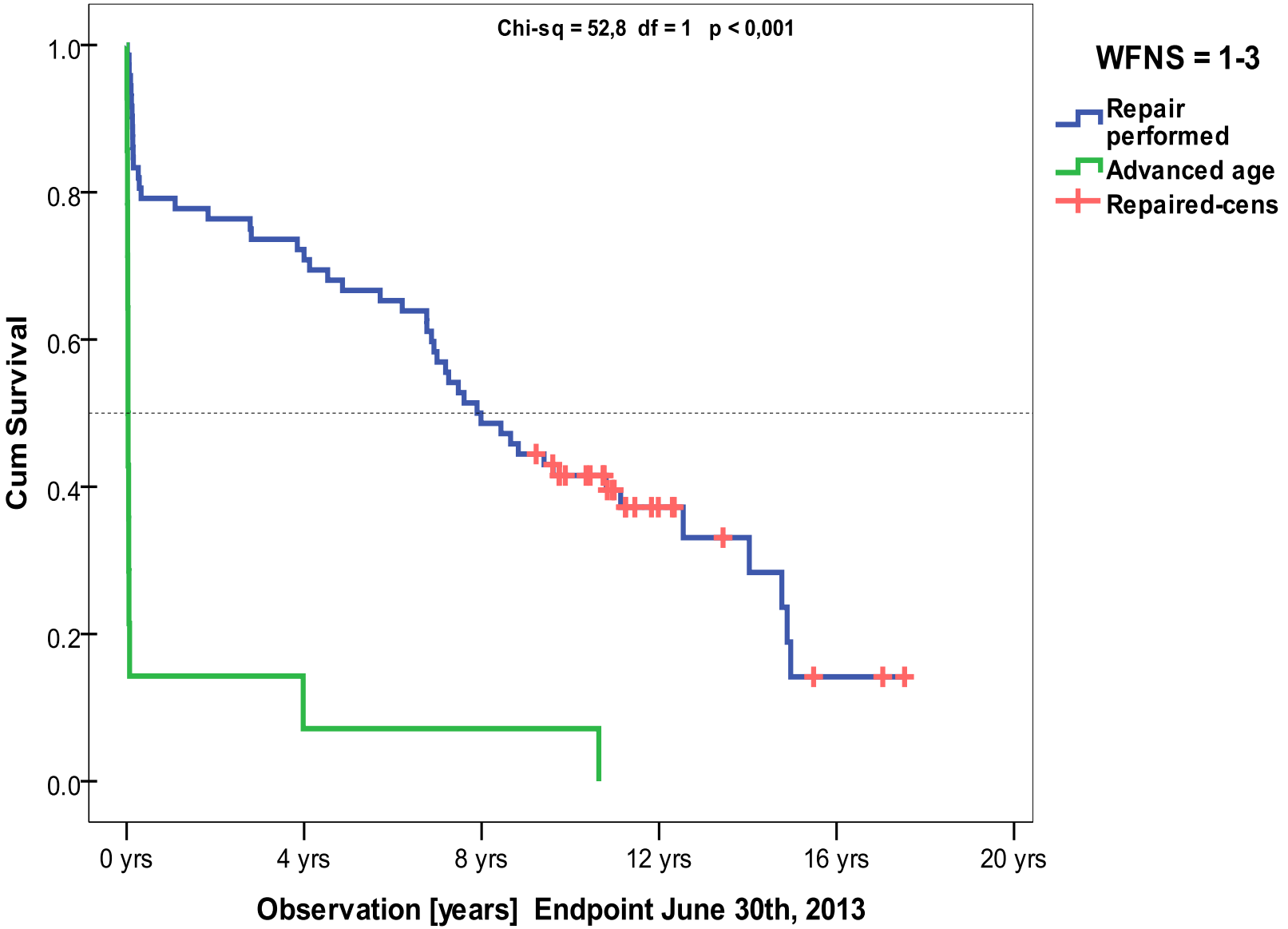
as to Fisher score, Aneurysm size, comorbidity, Expected life-years remaining ($p>0,18$)

But a trend towards difference as to age ($p=0.083$)

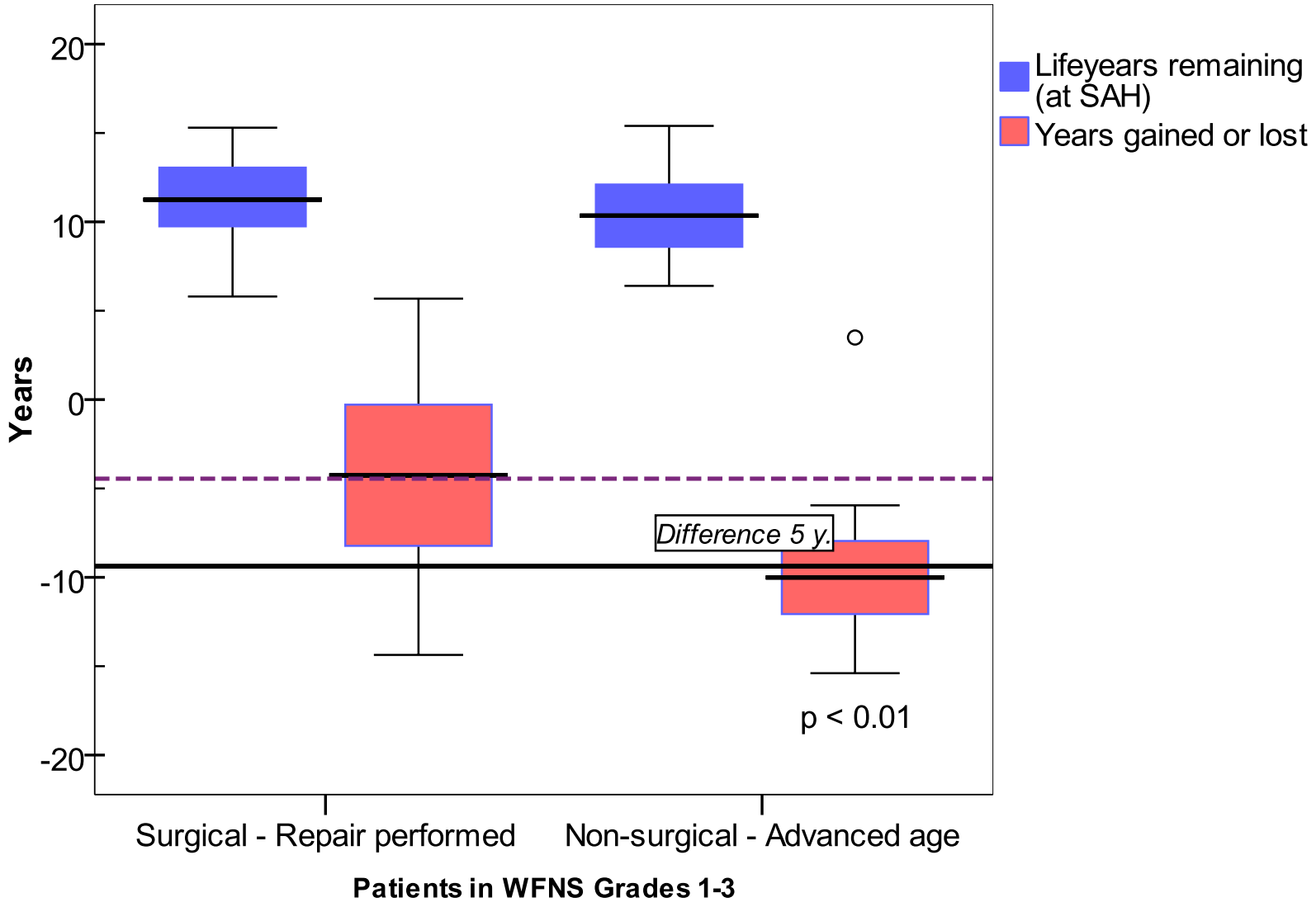
And a **significant difference** as to life-years lost ($p<0.01$),

Amounting to 5 years (difference between the means)

Survival Px admitted in WFNS Grades 1-3 after SAH



Non-surgical ”Advanced age” Px lost an average of 5 life-years



Is there an Excess Mortality after SAH?

It is commonly believed that patients who have recovered well after successful treatment of SAH from ruptured aneurysm will attain the life expectancy of the general population.

Subgroup from the present series: 18 Px

Admitted in WFNS = 1-3, aneurysm repaired, GOS = 5, and who died before the study endpoint:

Lost an average of 2.95 life-years (95%CI 0.5-5.4) compared to 11.3 life-years (10-12.5) expected remaining.

Discussion: two key findings

1) Aneurysmal SAH was associated with a significant **excess long-term mortality** among patients aged > 70 years admitted in good condition despite having recovered well from SAH and aneurysm repair.
2) Individuals admitted in good neurological condition (WFNS 1-3) after SAH, who received **non-surgical management** on grounds on “Advanced Age”, lost a further 5 life-years (mean).

Limitations – and Strengths

Study is observational retrospective, not prospective RCT

Hospital cohort, not population study.

Third-line teaching hospital,- pre-hospital selection bias possible.

Management regimens from the epoch under study, 1996-2004 - may not be fully representative of practice patterns current in 2014.

Total management outcome, not surgical outcome only.

Survival data for all Px – none lost to follow-up

10 years' follow-up after SAH is rarely reported, and has, to our knowledge, not been done for Px aged >70 years.

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Lessons learned

By studying the outcome of management decisions made one or two decades ago we may obtain a notion of the long term impact of today's regimens.

Therefore, we need to continuously challenge and rethink our current concepts, in order to expose obsolete opinions and beliefs and to replace them with proper evidence.

Lessons learned

Aneurysm repair should be considered in almost every case for:

‘…if surgery has its place anywhere, it is to keep someone from bleeding to death from a burst vessel.' [CG Drake 1971]