To the orthopedic surgeon, locally responsible for the Swedish Knee Arthroplasty Register

Here is the 2002 annual report, accounting for data registered during 2001.
The report is based on the content of the register as of October 1st 2002. There has been a steady increase in the number of operations reported. 6,865 were reported in 2001 or an increase of 15% compared to 2000. This report includes a historical overview of findings and describing our definitions and routines.

For practical reasons we have maintained our previous nomenclature for implant in this report. As previously, each surgical unit gets a list containing information on the arthroplasties they reported in 2001. It is our hope that you will compare the list with locally available data and help us correct any errors found. To make this easier, we provide 2 lists, one sorted on the ID and the other on the date of operation.

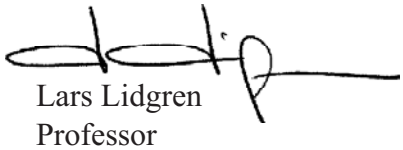
The first and second part of the report is general by nature and will be available for downloading from our website: www.ort.lu.se/knee/. It includes information on implants reported in 2001 as well as analyses regarding the latest 10-year period. This year, the patient administrative system (PAS) was not used to search for unreported revisions due to problems caused by changes in the legislation. However, we believe that the results are reliable. The registry has thus been crosschecked against the PAS for revisions performed until the end of 1999 while the analysis account for the 10-year period 1991-2000.

As previously each unit also receives a diskette. It contains information regarding all the registered arthroplasties reported by that unit. If the patients have been revised later at another location, information regarding those revisions is also included. We find it appropriate to remind you that the Swedish Knee Arthroplasty Register is a prospective project and that revisions reported to the register are only entered if the primary operation previously has been reported. Thus, if a primary operation became known at a later time as it became a subject of a revision, neither the primary nor the revision will be entered into the database. A late reporting of primary procedures is only allowed in cases when all primaries performed during a time period are reported collectively.

Some of the implants that previously have had a high revision rate have been withdrawn from the market. The revision rate is still relatively high for many of the newer Unicompartmental models and with some anxiety we follow the use of mini-incisions. Unicompartmental implants, even without mini-incisions are sensitive to surgical routine.

We at the project center in Lund want to thank you for your cooperation during the last year and ask you to digest and circulate the presented information.

Lund den 1 November 2002
On behalf of the Swedish Knee Athroplasty Register



Lars Lidgren
Professor

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Definitions

Revision is defined as a new operation in a previously resurfaced knee during which one or more of the components are exchanged, removed or added (incl. arthrodesis or amputation). This implies that soft tissue operations such as arthroscopy and lateral release are not considered revisions. The reason for this stringent definition is that some minor operations are not necessarily related to the primary surgery and thus cannot be considered a complication or failure.

All the Scandinavian registers do not use this stringent definition. For example the Finnish National Implant Register defines any re-operation as being a revision. However, in their reports, the additional operations account for only about 3 percent of the revision surgery.

TKA (Total or Tricompartmental Knee Arthroplasty) is defined as a knee arthroplasty where the femoral component has a flange and thus all three compartments of the knee are affected. Even in cases where a patellar button is absent, the flange resurfaces half of the femoropatellar compartment and the arthroplasty is still considered to be a TKA.

Bicompartmental arthroplasty (historical) uses two components, one on the femoral and one on the tibial side to resurface both the femorotibial compartments (medial and lateral) - but not the femoropatellar compartment. Thus, this implant has no femoral flange and is not meant to allow for resurfacing of the patella.

UKA (Unicompartmental Knee Arthroplasty) implies an arthroplasty that separately resurfaces the medial or lateral femorotibial compartment. (med. UKA or lat. UKA). If 2 UKA implants are used to resurface both femorotibial compartments the arthroplasty it is named bilateral UKA.

Patellar arthroplasty is used to resurface only the femoropatellar compartment. Even if this arthroplasty is unicompartmental by definition, it is accounted for separately.

Hinged implants. As the name implies these implants only allow for flexion and extension through a fixed axis.

Linked implants (Linked/Rotating hinge) have a mechanical coupling between the femoral and tibial component allowing for flexion and extension as well as for varying amount of rotation.

Stabilized implants. Even if the hinges and the linked implants are extremely stabilizing, the term stabilized implants is used for a group of prostheses that are a kind of TKA but use the form of the femoral and tibial component to restrict movement in valgus, varus and rotation. The posterior cruciate sacrificing type most often has an eminence in the middle part of the tibial polyethylene that can be contained by a box in the femoral component that lies between the medial and lateral sliding surfaces. By a camshaft-like property, the femoral component is forced to slide back during flexion, which simulates the effect of the posterior cruciate ligament. The fit between polyethylene and metal is such that it allows for some rotation. In so-called superstabilized implants the congruency has been increased by making the eminence larger with a total fit against the box of the femoral component thus, restricting the rotation and varus/valgus movement. Intermediary forms also occur. Stabilized implants are most often used for revision but also for the more difficult primary arthroplasties.

The ordinary TKA can be made somewhat more stabilized by increasing the congruency between the sliding surfaces. In these instances there is a slight eminence of the polyethylene that fits against the femoral component. However, the term stabilized is only used for those implants that are more stabilized than usual by use the above mentioned camshaft construction.

Filling in the Knee Register form

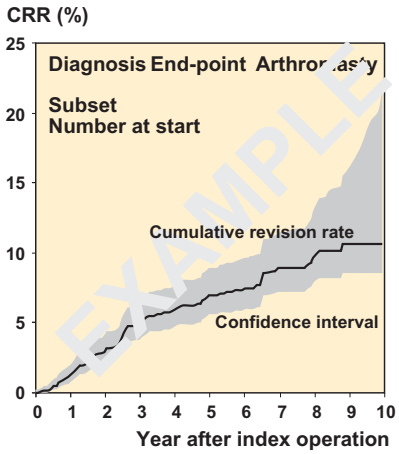
The Knee Register uses a form that it recommends to be filled in during the operation, (by a nurse or other attending personal). The implant-stickers (containing the Part No's and Lot No's) for all used implants are to be affixed to the form. Besides the ID of the patient, the date of operation, diagnosis, side operated, brand of cement and cementing of components has to be filled in. For UKA, information if miniarthrotomy was used must be specified. Information regarding the operating surgeon is voluntary. The form is sent to Lund (once a month) where the data is computerized. In our opinion, this procedure has considerable advantages such as minimal workload for the participating units, the most certain information with the least chance of wrong coding. Furthermore, it allows the staff of the registry to check unknown Part.No's during input.

How the Knee Register compares implants

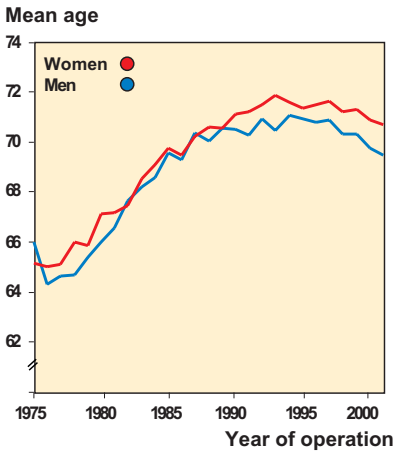
Survival analyses are used for graphical presentation of data using curves that show the Cumulative Revision Rate (CRR). They describe what percentage of the operated patients became revised with time. The calculation is based on the sum of all the revisions and expresses the rate as if none of the patients had died. Most often the time-axis shows a 10-year period. However, it has to be kept in mind that the patients are included as time goes on. Thus, all the patients have not been followed for the whole period. This implies that if 1,000 patients were operated on each year (and nobody dies), a 10-year study would include 10,000 patients of which only 1,000 had been followed for more than 9 years. The last part of the curve (at the right) therefore expresses the long-term rate of revision for patients operated more than 9 years earlier. As the number of these patients is relatively small, the 95% confidence interval becomes large. When the number of patients at risk is small (at the right of the curve), each revision has a large effect (e.g. 50% are revised when 2 patients are left and one has a revision). For this reason the Register cuts the curves when less than 40 patients are left at risk.

A disadvantage of CRR curves is that they express the revision rate for a defined group of patients and do not allow for taking other factors into account (e.g. age and gender). It is possible to circumvent the problem by analyzing smaller groups of different gender and age. However, this unfortunately reduces the number of patients available for analysis which in turn reduces the power of statistical conclusions.

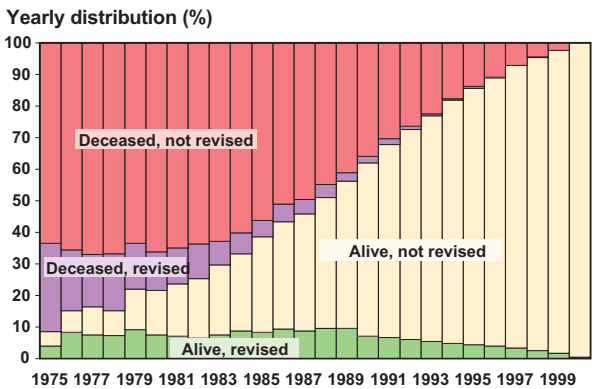
Cox regression allows for taking into account different factors that may vary within a group. The result cannot be shown as curves with confidence intervals but is expressed as risk ratios between factors. If the factor is a category (e.g. a implant), one category is defined as a reference with a risk of 1 to which the other categories are compared. An implant with the risk 1.2 thus has 20% increased risk of becoming revised etc.. For numerical variables (e.g. mean age) the risk ratio relates to the change in risk if the variable increases by one unit (e.g. 1 year). When comparing groups where uneven distribution of factors can be expected (e.g. age in cemented vs. uncemented implants) the Cox regression is especially important.



Example of a CRR curve.



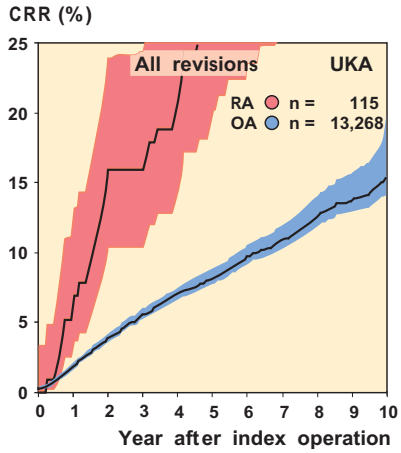
The last 5-year period set aside, the mean age of patients has increased. Therefore, when comparing the rate of revision in series of patients operated during different time periods, Cox regression or separate analyses for different age groups have to be performed.



Survival statistics are used to calculate how long an implant stays unrevised. As times goes by, the percentage of deceased patients increases (fig. left). During their lifetime these patients were at risk of becoming revised and the statistics allow them to supply information for that period of time. The probability for each revision that occurs is related to the number of unrevised patients alive with that particular follow-up time. All the probabilities are then added to produce the cumulative rate of revisions.

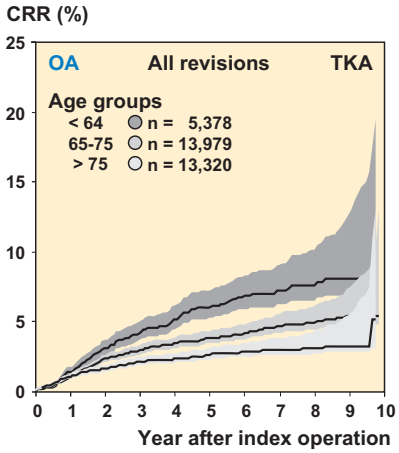
Factors that influence the revision rate

Primary disease – Early it became evident that patients with different primary disease, e.g. rheumatoid arthritis (RA) and osteoarthritis (OA) followed a different postoperative course with differences in the revision rate. Therefore the registry has always produced separate curves for these diagnoses. The differences in CRR between OA and RA that receive unicompartmental knee arthroplasty (UKA) demonstrate the importance of this.



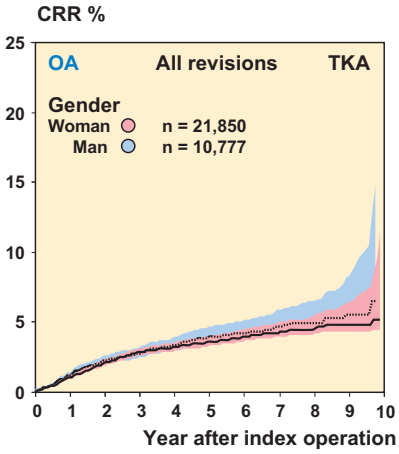
The difference in CRR between OA and RA with UKA shows that these diagnoses have to be separated (Risk Ratio 3.5). However, UKA is no longer used for patients with RA.

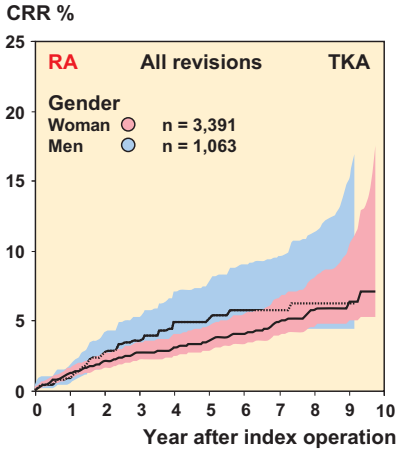
Age – The effect that the age of the patients at the primary operation has on the CRR is illustrated by analyzing diffrent age groups separately.



The differences in CRR (1991–2000) between the 3 age groups <65, 65–75, >75 were significant for OA operated on with TKA and UKA but not for RA with TKA.

When calculating CRR it would be reasonable to only compare similar age-groups. However, this method would reduce the size of the material and thus the statistical usefulness. The problem with relying on CRR without taking the age into account can be illustrated by the comparison of patients with OA and RA that are operated on with a TKA. While the curves for both groups are very similar, the RA patients have a substantially lower mean age. Cox regression shows that when age has been taken into account, the OA group has 1.3 times the risk of the RA group of becoming revised.

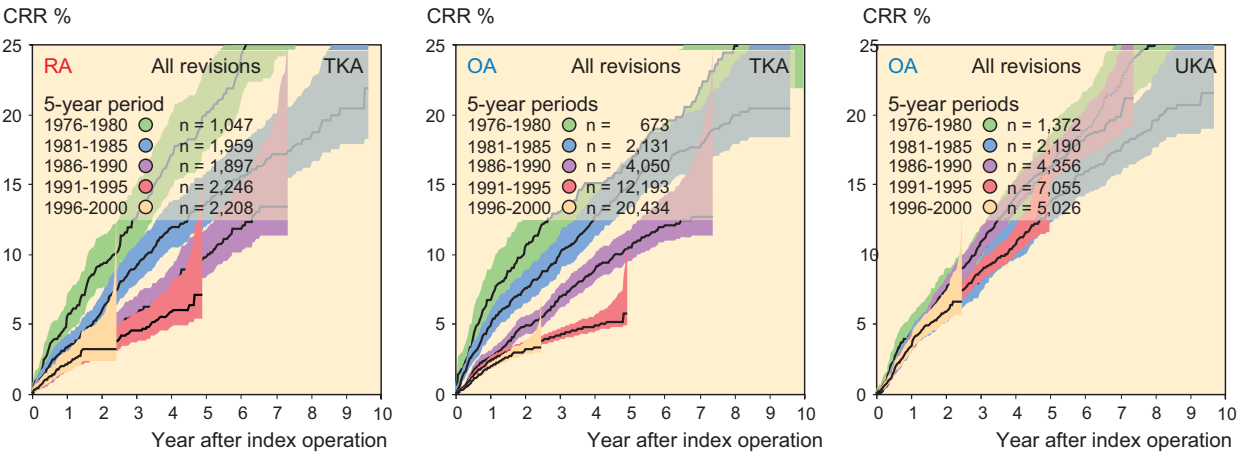




The difference in CRR (1991–2000) between OA and RA operated on with TKA is not large (gender shown separately). However, Cox regression that adjusts for age, gender and year of operation reveals that the Risk Ratio for OA is 1.3 that of RA.

Gender – The registry has for RA, but not for OA, been able to find a difference in the risk of revision between the sexes. (Men with RA and TKA have a Risk Ratio of 1.5 that of comparable women - see above).

Year of operation – Over the years the risk of revision has lessened for TKA. The reduction is not only to be explained by the increasing mean age at operation, and even if it can be explained by improved implants, reduction has also been

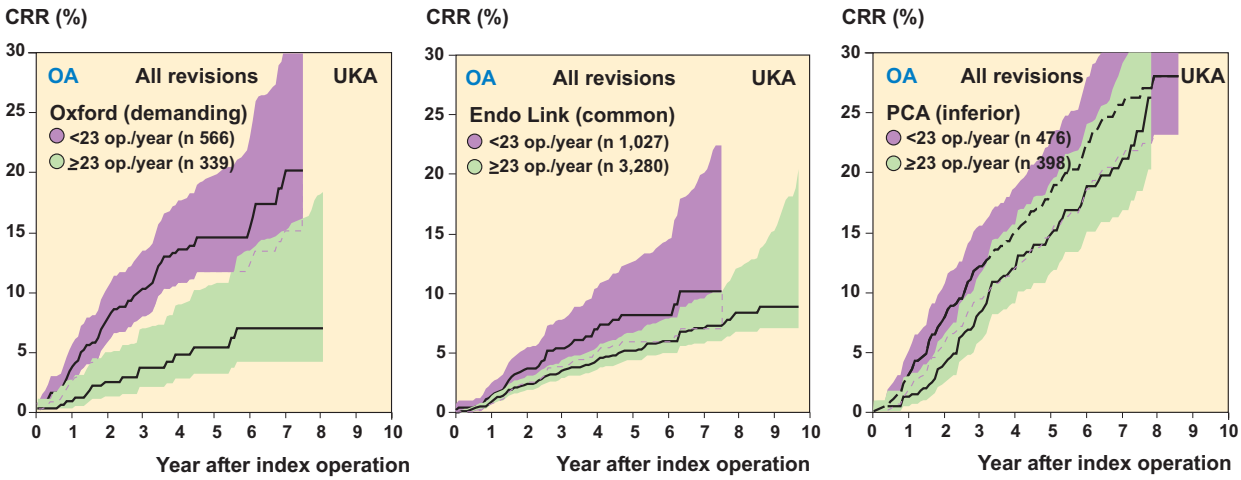


Reduction in the revision rate with time was seen for TKA but not UKA when the time periods 1976–1980 (green), 1981–1985 (blue), 1986–1990 (violet), 1991–1995 (red) och 1996–2000 (orange) were compared.

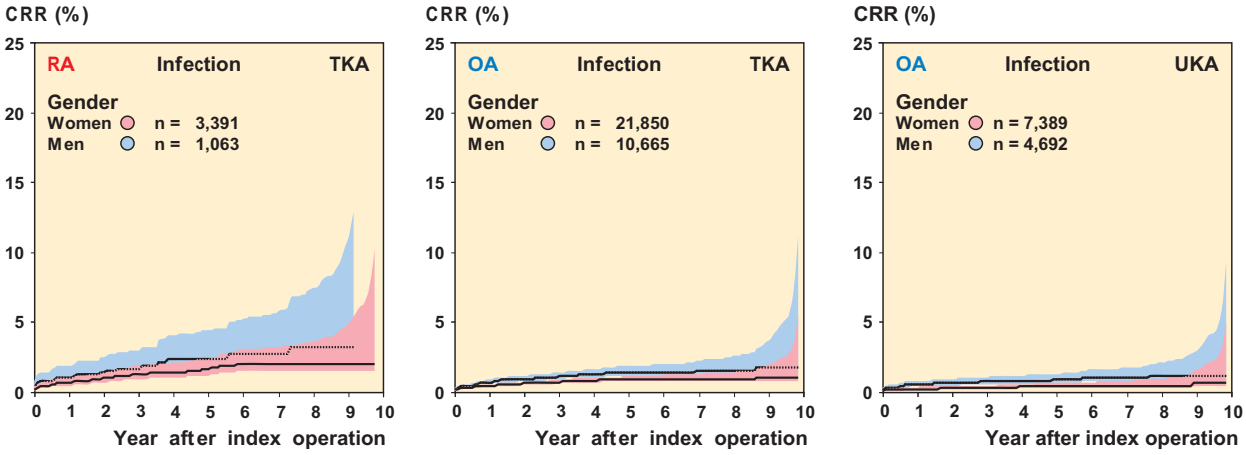
seen for unchanged implants (Lewold, S et al. 1993). This indicates improvement in technique (cementing/seating) or in patient selection which explains why comparison between implants must take into account during what time-period they were inserted. Improvement with time has not been seen for the UKA, which probably is caused by some newer models that have shown inferior results. Furthermore, the number of UKA operations has lessened which maybe has reduced the surgical routine.

Surgical routine – For the UKA implants we have shown that there is a relation between the number of operations performed in hospitals and their rate of revisions. Thus, a group of units that performed less than 23 operations/year had substantially more revisions than those that performed more. The Oxford implant with meniscal bearing was found especially sensitive to the surgical routine. The Swedish results for this implant have been quite different and worse than what has been published from large centers in England. This has lead the producer to require that surgeons learn the operative technique before they can use the implant. It is very likely that the surgical routine can affect the results of other implant types such as the TKA.

Type of implant – Hinges, linked and stabilized implants are mainly used for revisions or especially difficult primary cases. In uncomplicated primary cases TKA is used and if the disease is unicompartmental an UKA may do. For a proper comparison of TKA and UKA the results of patients with osteoarthritis are of interest. Although the UKA has been shown to have substantially higher CRR than TKA, the number of serious complications such as infection/arthrodesis/amputation is much less. If a primary UKA is revised to a TKA at a later time, the risk of re-revision is not significantly increased



The majority of orthopedic units performed relatively few UKA/year and there is a relation between the yearly number and the risk of later revision. For the 3 examined models (above) the effect of volume on CRR varied. The technically demanding Oxford implant was more affected than the most usual Link implant while the inferior PCA implant was not affected by volume at all.

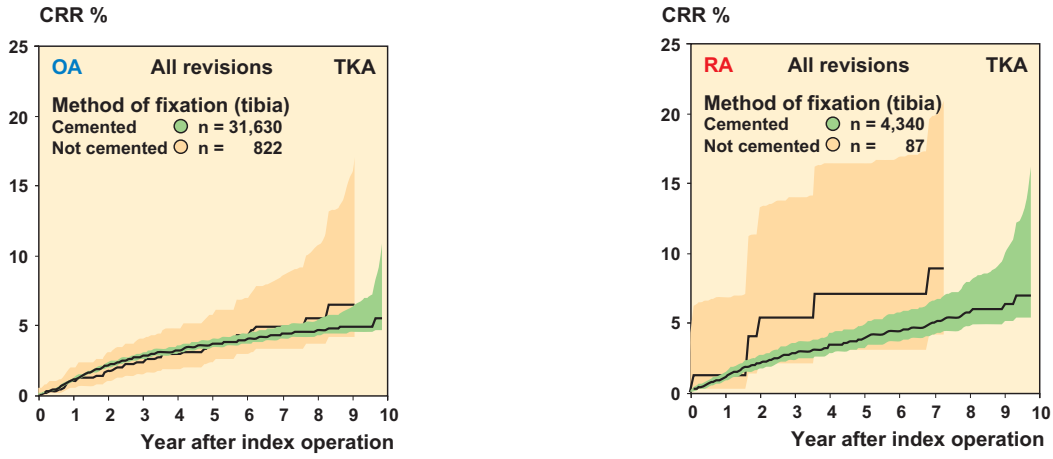


Using revision because of infection as end-point the statistics shows that RA patients are more often affected (Risk Ratio 1.8) and that within each group men are more often stricken than women. The UKA with smaller components than the TKA are less affected.

compared to the risk of revision if the patient had primarily been operated on with a TKA. As the UKA implants are less expensive than the TKA, the increased number of revisions due to their use has not resulted in additional cost. When asked, patients with TKA and UKA seem equally satisfied with their knees. In summary we conclude that it cannot be considered wrong to use UKA implants for an unicompartmental disease.

Use of cement – We have previously found that cement free insertion of the tibial component is associated with an increased risk of revision. This is in agreement with the results of the Finnish implant register that has found substantially increased risk of revision for uncemented implants. For the period 1991–2000 we dont observe any significant diffrences any longer. However, only in 2,5% of the cases the tibial component was uncemented.

Patellar button in TKA – Estimating how the use of a patellar button affects the revision rate is complex. The use of a patellar button varies with the brand of TKA used while simultaneously its use has lessened over the years. Hitherto, when the TKA implants are analyzed together, we have not found the use of patellar button to influence the revision rate. However, when comparing different time-periods one finds that during the eighties when patellar buttons were used in half of the cases its use had a negative effect. In the nineties during which patellar buttons were used in one quarter of TKA the effect has started to change to the advantage of the button. If only the most commonly used TKA is analyzed (AGC) we find that CRR is considerably lower when a button is used. This finding in combination with the previous finding that patients that receive a patellar button are more satisfied with their knee (at least early on) implies



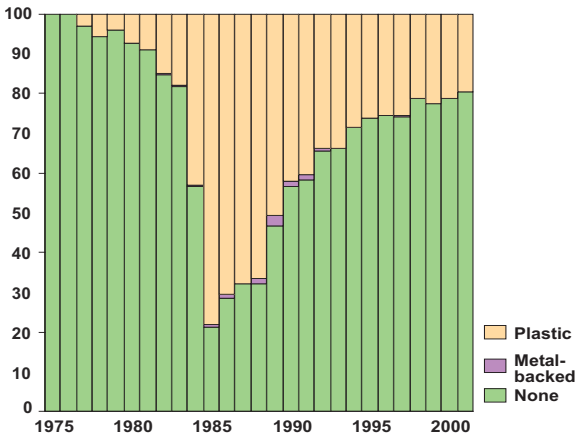
CRR for TKA with uncemented tibial component compared to a cemented is not significantly higher any longer.

that a patellar button could be inserted more often - at least for the elderly.

Implant model (brand) – The model is the factor that generates most interest and most often is related to the result after knee arthroplasty. As can be suspected from what has been said, the results are not only affected by the model or design of the prosthesis. In Sweden the most commonly used implants have also been those with the lowest CRR. This can be due to a good design but also due to the surgical routine as the same implant is often used. However, some models have had con-side-rably worse results than others. Of the newer brands the Miller-Galante can be mentioned but the use of that implant has now ceased.

Regarding the UKA it seems that most the newer implants have not improved survivorship over the more older ones.

Distribution (%) of TKA with and without a patellar button.

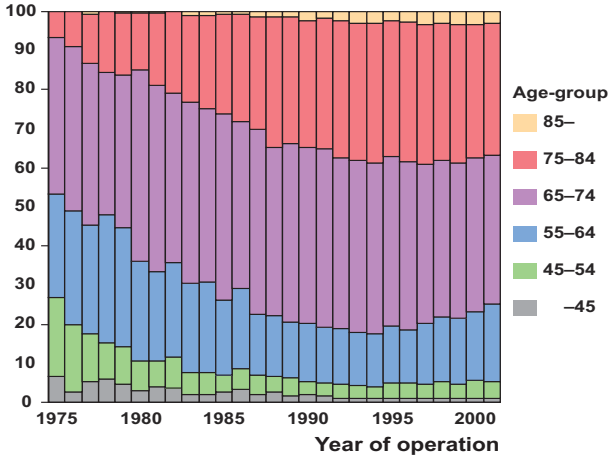


Mean age, age distribution and future incidence

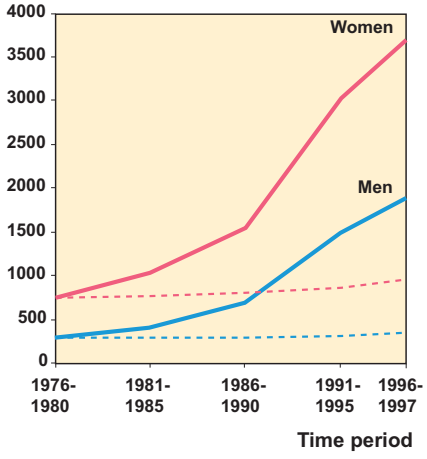
The mean age at the primary operation evenly increased from approx. 65 years in 1975 to approx. 72 years in 1994. (Fig. Page 3). Since then the mean age has not increased but rather shown the tendency of decreasing. The main reason for the rise in mean age has been that older age groups have been offered surgery. However, since 1994 the relative number of patients less than 55 years has again increased.

In a recently published article in *Acta Orthopaedica Scandinavica* (2000; 71: 376-380) it was demonstrated how the number of operations had increased substantially more than could be explained by ageing of the population. Further, it was found that the expected changes in the age distribution would increase the demand for knee arthroplasty by 36% by 2030. At the same time it was argued that the incidence of operations still was rising, why the actual demand would be considerably higher. The article that was based on data until the end of 1997 predicted that provided that the incidence was unchanged (as it was in 1996-1997), the number of arthroplasties in year 2015 would be 5,647. The presently reported 6,865 arthroplasties indicates that the incidence still is on the rise.

Yearly age distribution (%) for primary arthroplasty



No. of knee arthroplasties



Knee arthroplasties / year in the marked time-periods. A solid line shows the observed number of operations while a dotted line shows the number to be expected if the increase only had been caused by changes in the age-distribution.

Patient satisfaction and health questionnaires

In 1997 all living registered patient were inquired by mail how satisfied they were regarding their knee. Nine months later, 3,600 of these patients were asked the same question again. They also received a more comprehensives general health questionnaire and a disease/knee specific questionnaire.

The different questionnaires were psychometrically analyzed and it was found that the simpler the questionnaire was, the better the response rate. Those that did not answer the second time had previously been more dissatisfied than on average. To study the results after knee arthroplasty in a postal survey, one wants to maximize the response rate as well as to use a sound questionnaire with good psychometric properties. It was found that the most suitable questionnaires for this purpose were the SF12 (general health) and Oxford 12 (knee specific). The Swedish Oxford 12 translation is shown below.

Oxford 12

Problem med ditt knä

Under de senaste fyra veckorna... Markera en ruta för varje fråga

Under de senaste fyra veckorna...

1 Hur skulle Du beskriva den smärta Du vanligtvis har i Ditt knä?

Ingen	Mycket lindrig	Lindrig	Måttlig	Svår
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

2 Har Du haft några problem med att tvätta Dig och torka Dig (hela kroppen) på grund av Ditt knä?

Inga problem alls	Mycket lite problem	Måttliga problem	Mycket stora problem	Omöjligt att göra
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

3 Har Du haft något problem med att komma in i eller ut ur bil eller med att använda offentligt transportmedel (vilket Du nu tenderar att använda) på grund av Ditt knä?

Inga problem alls	Mycket lite problem	Måttliga problem	Mycket stora problem	Omöjligt att göra
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

4 Hur länge har Du kunnat promenera innan smärtan i Ditt knä blivit **svår**? (Med eller utan käpp)?

Ingen smärta / >30 min	16 till 30 min	5 till 15 min	Endast runt huset	Inte alls - svår smärta direkt vid promenad
☐	☐	☐	☐	☐

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Problem med ditt knä

Under de senaste fyra veckorna... Markera en ruta för varje fråga

Under de senaste fyra veckorna...

5 Efter en måltid (sittande till bords), hur smärtsamt har det varit för Dig att resa Dig upp från stolen på grund av Ditt knä ?

Inte smärtsamt alls	Lätt smärtsamt	Måttligt smärtsamt	Väldigt smärtsamt	Outhärdligt
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

6 Har Du haltat då Du promenerat på grund av Ditt knä?

Sällan / aldrig	Ibland eller endast i början	Ofta och inte bara i början	Merparten av tiden	Hela tiden
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

7 **Kan** Du sätta dig ner på huk och komma upp igen efteråt?

Ja, lätt	Med viss svårighet	Med måttlig svårighet	Med mycket stor svårighet	Nej, omöjligt
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

8 Har Du besvärats av smärta i Ditt knä då Du legat till sängs på natten?

Inga nätter	Bara 1 eller 2 nätter	Vissa nätter	De flesta nätter	Varje natt
☐	☐	☐	☐	☐

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Problem med ditt knä

Under de senaste fyra veckorna... Markera en ruta för varje fråga

Under de senaste fyra veckorna...

9 I vilken grad har smärtan i Ditt knä påverkat Ditt vanliga arbete (inklusive hushållsarbete)?

Inte alls	Lite grann	Måttligt	I hög grad	Fullständig
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

10 Har det känts som om Ditt knä plötsligt skulle "vika sig" eller svika Dig?

Sällan / aldrig	Ibland eller bara i början	Ofta och inte bara i början	Merparten av tiden	Hela tiden
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

11 **Kan** Du handla det som behövs till hushållet på egen hand?

Ja, lätt	Med viss svårighet	Med måttlig svårighet	Med mycket stor svårighet	Nej, omöjligt
☐	☐	☐	☐	☐

Under de senaste fyra veckorna...

12 **Kan** Du gå nerför en trappa?

Ja, lätt	Med viss svårighet	Med måttlig svårighet	Med mycket stor svårighet	Nej, omöjligt
☐	☐	☐	☐	☐

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Type of operations and implants in 2001

6,865 primary prosthesis reported in 2001, by type and region

TYPE	Stockholm Gotland	Uppsala Örebro	Southeast	South	West	North
Hinges	3					
Linked		9		5	5	1
TKA	1,251	1,392	655	1,082	879	632
UKA medial	194	199	62	297	128	40
UKA lateral	5	7	1	2	3	1
Patella		4	1	5	1	1
TOTAL	1,453	1,611	719	1,391	1,016	675

Implant for primary TKA in 2001

	Number	Percent
AGC	1,640	27,8
PFC Sigma	1,569	26,6
F/S MIII	815	13,8
Duracon	712	12,1
NexGen	486	8,2
Kinemax	265	4,5
Scan	160	2,7
Profix	86	1,5
LCS	73	1,2
AMK	17	0,3
Other	66	1,2
Total :	5,891	100,0

Implant for primary UKA in 2001

	Number	Percent
Link Uni	431	45,9
MillerGalante Uni	321	34,2
Oxford Uni	84	8,9
Genesis	46	4,9
PFC-Uni + S	28	3,0
Duracon Uni	21	2,2
Other	8	0,9
Total :	939	100,0

Compared with 2000, the number of reported primary arthroplasties has increased from 6,036 to 6,865 or 14%. All units have reported to the registry and allthough some additional corrections may occur later, they are only expected to cause minor changes in the operations reported.

Use of TKA increased 16% between 2000 and 2001 and in this group the most common implants have kept their lead. PFC, Freeman-Samuelsson, Duracon and NexGen are the implants that have most increased their marketshare.

Use of UKA increased 4% between 2000 and 2001 and the order of popularity for the implants is unchanged. Miller Galante-Uni is the implant that increased its marketshare most during the year.

The 3 most common implants for primary TKA in each region in 2001

	Model 1	n	Model 2	n	Model 3	n	Other
Stockholm / Gotland	PFC S	816	Duracon	207	F/S MIII	72	156
Uppsala / Örebro	AGC	448	F/S MIII	436	Kinemax	222	286
Southeast	AGC	230	PFC S	230	NexGen	193	2
South	Duracon	337	PFC S	296	AGC	293	116
West	AGC	344	F/S MIII	306	Duracon	74	155
North	AGC	266	PFC S	154	Profix	86	

The 3 most common implants for primary UKA in each region in 2001

	Model 1	n	Model 2	n	Model 3	n	Other
Stockholm / Gotland	MillerGal.	157	Oxford	18	Link	17	7
Uppsala / Örebro	Link	153	PFC	19	MillerGal.	16	18
Southeast	Genesis	23	Link	18	MillerGal.	15	7
South	Link	213	Oxford	31	MillerGal.	29	26
West	MillerGal.	80	Oxford	32	Link	16	3
North	MillerGal.	24	Link	14	Oxford	3	1

Bone cement and incision in 2001

Use of bone cement in 2001

	Primary TKA		Primary UKA	
All components cemented	5,139		937	
Only the patellar button without cement	596			
The Femur and tibia components without cement (2 with cem pat)	126			
Only the Femur component without cement	5			
Only the tibia component without cement	4			
The Femur component and patellar button without cement	3			
The Femur-, tibia- and patellar components without cement	3			
Information missing	15		2	
Total	5,891		939	
	Number	Percent	Number	Percent
Palacos/Gentamycin	5,343	92,7	881	93,8
Palacos	235	4,1	38	4,0
Refobacin-Palacos R	129	2,2	11	1,
Palacos/Genta + Versabond	19	0,3	0	0,0
CMW/Gentamycin	13	0,2	2	0,2
Simplex	10	0,2	3	0,3
Copal	8	0,1	0	0,0
Cemex/Gentamycin	1	0,0	0	0,0
Information missing	6	0,1	4	0,4
Total	5,764	100,0	939	100,0
All implanted parts without cement	127			
Grand Total	5,891			

NB Handwriting the type of cement on the report may be a source of error.

The units are encouraged to use the sticker that comes with the cement package.

Type of bone cement

In Sweden, the use of bone cement is the most common method for fixing the implants to the bone. In 2001 approximately 2% of all TKA were completely without cement and cement was used in all UKA. Palacos bone cement continues to be the dominating type of cement being used in 99% of the cemented prothesis. Only 4% of the cemented implants were implanted without having antibiotics in the cement.

We want to remind the operative units to report the type of bone cement used using the stickers that normally are to be found in the cement packages.

Mini-incision

For UKA we have since 1999 registered whether the implant was inserted by a standard arthrotomy or by the new type of mini-arthrotomy.

Our definition of mini-incision implies that the surgeon gains access to the knee joint by the use of a very small arthrotomy and without needing to dislocate/evert the patella. The benefit of the procedure has been claimed to be less traumatic surgery, quicker rehabilitation and shorter hospital stay.

Minimally invasive technique seems to be gaining popularity. Thus it has increased from being used in 33% of the UKA implanted in 2000 to 40% in 2001. Even though the material is still small and has not been followed longterm, there are indications showing that the mini-incision increases the revision rate. If that is due to the learning curve and whether the results will improve in the future can only be speculated on. However, as the UKA has been shown to be sensitive to surgical routine without a mini-incision, it is not inconceivable that the new operating procedure may further deteriorate the long-term results.

The type of incision for 939 UKA in 2001

	Incision		
	Standard	Mini	No info
Link Uni	335	84	12
MillerGalante Uni	107	207	7
Oxford Uni	0	81	3
Genesis	43	0	3
PFC-Uni	23	4	1
Duracon Uni	21	0	1
Allegretto	0	3	0
Others	0	0	3
Unknown implant	0	1	0

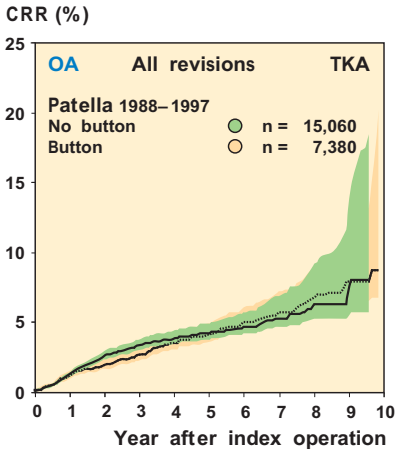
Use of patellar button in 2001

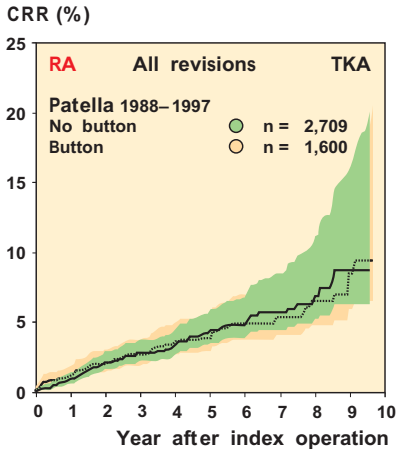
Patellar button for TKA in 2001

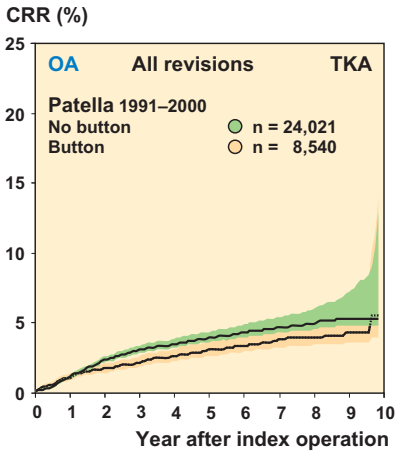
The use of patellar button is heavily dependent on the implant model used. Thus, those using Freeman-Samuelson implants most often inserted a button during the primary operation while those using LCS (New Jersey) and Scan Knee seldomly did. In previous analyses (1988-1997) we found no difference in CRR dependent on the use of patellar button. However, as mentioned in the last report, there has been a tendency for a change to the advantage of the patellar button. During the present time period we found a lower CRR when a patellar button was used. If only AGC implants were analyzed, the difference became still more evident.

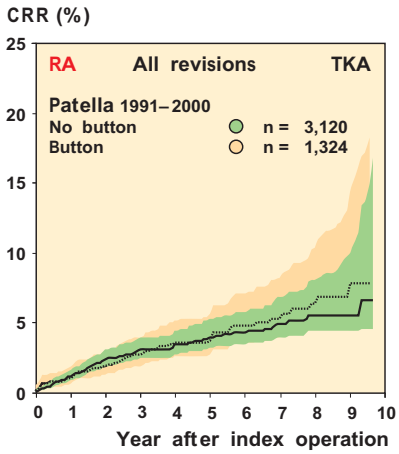
Use of patellar button for primary TKA in 2001

	No patellar button	%	Patellar button	%
AGC	1,404	85,6	236	14,4
PFC	1,414	90,1	155	9,9
Freeman/Samuelsson	178	21,8	639	78,2
Duracon	657	92,3	55	7,7
NexGen	477	98,1	9	1,9
Kinemax	228	86,0	37	14,0
Scan Knee	160	100,0	0	0,0
Profix	76	88,4	10	11,6
New Jersey (LCS)	73	100,0	0	0,0
AMK	16	94,1	1	5,9
Other	56	84,8	10	15,2
Total	4,739	80,4	1152	19,6









The general CRR during the analyzed period 1988-1997 was not affected by whether or not a patellar button was used in TKA. However, during the current 10-year period the CRR is lower for TKA with patellar button. The need for secondary patellar additions has to be weighted against the frequency of loosening of the patellar buttons.

Implants and revisions during 1991–2000

Operations performed early on during the analyzed period have a relatively large influence on the cumulative revision rate. Subsequently this has the largest impact on the older implants.

To be able to account for the reasonably long-term results of relatively modern types of implant types, the registry usually uses the latest 10-year period that is available for analysis.

Implants for primary TKA in 1991–2000

	Number	Percent
AGC	13,180	34,0
F/S MIII	4,885	12,6
F/S unspec	547	1,4
Duracon	3,509	9,0
Kinemax	3,157	8,1
PFC	2,967	7,6
PFC-Sigma	2,522	6,5
Scan	2,857	7,4
MillerGalante2	1,090	2,8
Mill/G unspec	373	1,0
NexGen	1,000	2,6
AMK	624	1,6
PCA-Mod	454	1,2
PCA ospec	118	0,3
LCS	448	1,2
Profix	170	0,4
Synatomic	162	0,4
Tricon	149	0,4
Axiom	139	0,4
Osteonics	64	0,2
Rotaglide	63	0,2
Kinematic	39	0,1
Nuffield	37	0,1
Genesis	31	0,1
Other	217	0,6
Total :	38,802	100

Implants for primary UKA in 1991–2000

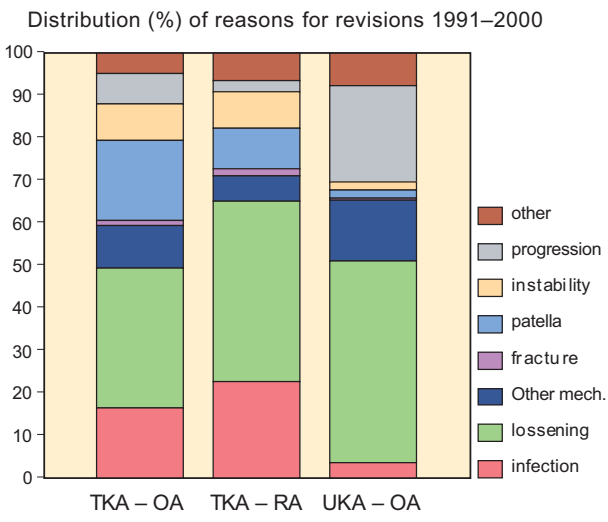
	Number	Percent
Link-Endo	4,979	39,6
Link-St,Georg	401	3,2
Marmor / Richards	1,990	15,8
MillerGalante	1,177	9,4
Brigham	1,017	8,1
Oxford	785	6,2
Duracon	681	5,4
PFC	582	4,6
Alligretto	311	2,5
Genesis	282	2,2
Repicci (AARS)	212	1,7
PCA	141	1,1
Other	18	0,1
Total	12,576	100

Linked implants (primary) in 1991–2000

	Antal	Percent
Endo rotation	106	67,1
Kotz	30	19,0
St. Georg rotation	18	11,4
Other	4	2,5
Total	158	100

Revisions during 1991–2000

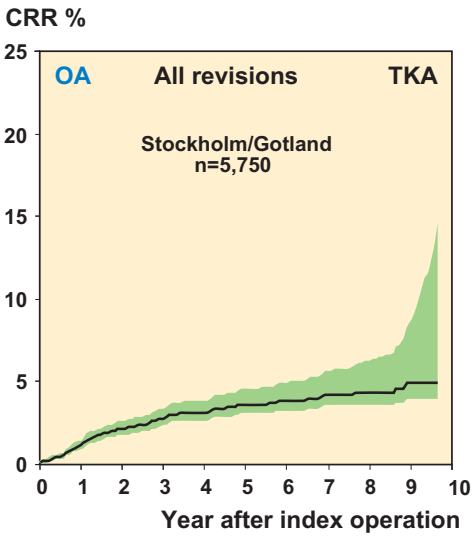
1,328 revisions of TKA´s for OA, 390 of TKA for RA and 1,574 revisions of UKA for OA were performed during the 10-year period. The indications for the revisions are shown in the diagram. Note that the index-operations may have been performed before the accounted 10-year period. Loosening remains the dominant reason for revision. ”Progression” in TKA mainly reflects revisions performed for femoropatellar arthrosis/arthritis. ”Patella” includes all kind of problems with the patella in patients that had their primaries inserted with or without a patellar button. Please note that the distribution of the reasons for revision does not have to reflect the risk of these complications which preferably are evaluated by CRR.



TKA implants for osteoarthrosis in the regions 1991–2000

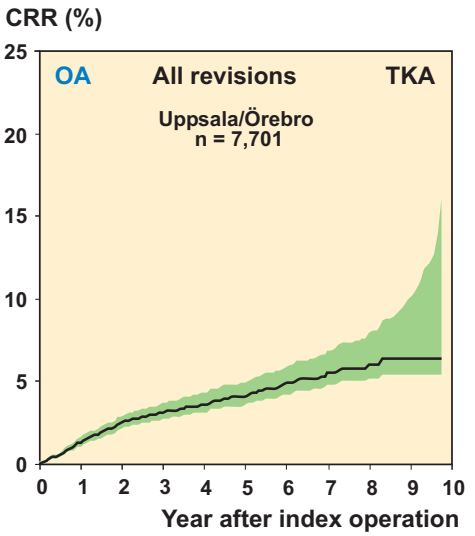
Stockholm + Gotland
Implants for primary TKA in OA 1991–2000

	Number	Percent
AGC	2,531	44,0
PFC Sigma	1,101	19,1
PFC	399	6,9
Kinemax	748	13,0
Duracon	569	9,9
F/S MIII	126	2,2
NexGen	77	1,3
AMK	66	1,1
PCA-Mod	60	1,0
F/S unspec	26	0,5
Genesis	14	0,2
Rotaglide	10	0,2
LCS	10	0,2
Other	13	0,2
Total	5,750	100,0



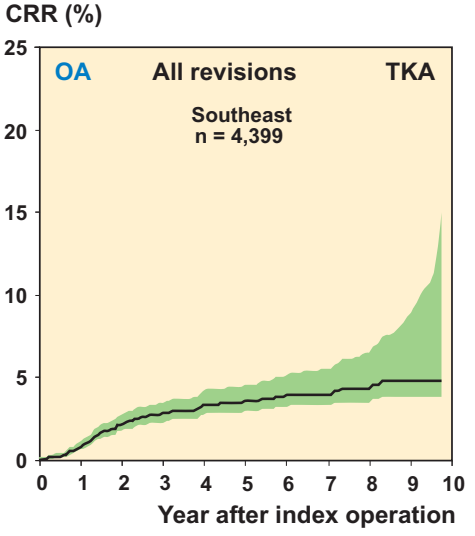
Uppsala-Örebro
Implants for primary TKA in OA 1991–2000

	Number	Percent
F/S MIII	2,238	29,1
F/S unspec	131	1,7
AGC	1,918	24,9
Kinemax	1,827	23,7
MillerGalante2	368	4,8
MillerGalante unspec	64	0,8
Scan	359	4,7
AMK	295	3,8
NexGen	224	2,9
PFC	78	1,0
PFC Sigma	67	0,9
PCA	45	0,6
PCA-Mod	26	0,3
Tricon	25	0,3
Other	37	0,5
Total	7,702	100,0



Southeast
Implants for primary TKA in OA 1991–2000

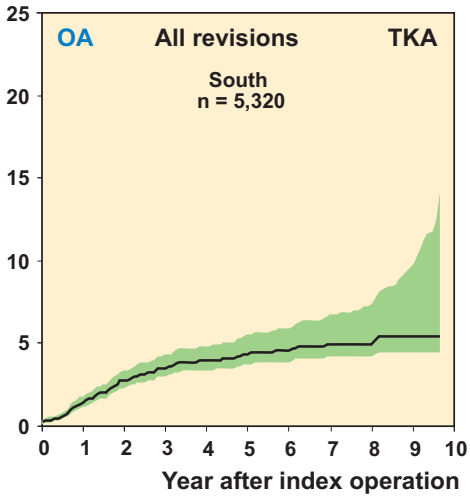
	Number	Percent
AGC	1,915	43,5
NexGen	547	12,4
PFC	506	11,5
PFC Sigma	257	5,8
MillerGalante2	394	9,0
MillerGalante unspec	129	2,9
Duracon	343	7,8
Scan	108	2,5
PCA-Mod	93	2,1
PCA	11	0,3
Kinemax	45	1,0
F/S MIII	10	0,2
Other	41	0,9
Total	4,399	100,0



South
Implants for primary TKA in OA 1991–2000

	Number	Percent
Duracon	1,337	25,1
Scan	1,068	20,1
AGC	979	18,4
PFC	947	17,8
PFC Sigma	404	7,6
Synatomic	119	2,2
PCA-Mod	86	1,6
PCA	10	0,2
Axiom	63	1,2
Osteonics	63	1,2
F/S MIII	60	1,1
Rotaglide	47	0,9
LCS	40	0,8
Nuffield	37	0,7
AMK	13	0,2
Other	47	0,9
Total	5,320	100,0

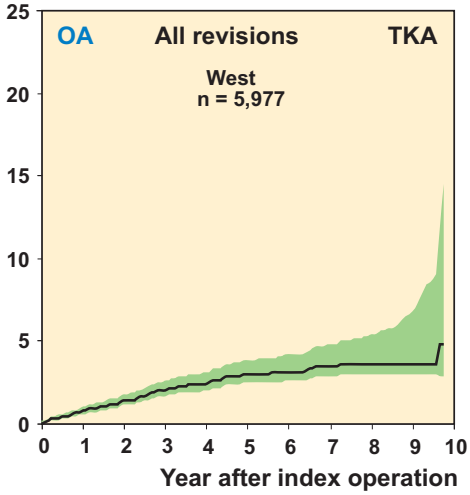
CRR (%)



West
Implants for primary TKA in OA 1991–2000

	Number	Percent
AGC	3,046	51,0
F/S MIII	1,428	23,9
F/S unspec	227	3,8
Scan	415	6,9
Duracon	388	6,5
AMK	115	1,9
PFC Sigma	114	1,9
PFC	33	0,6
Axiom	72	1,2
MillerGalante2	46	0,8
MillerGalante unspec	25	0,4
PCA-Mod	27	0,5
NexGen	19	0,3
Other	22	0,4
Total	5,977	100,0

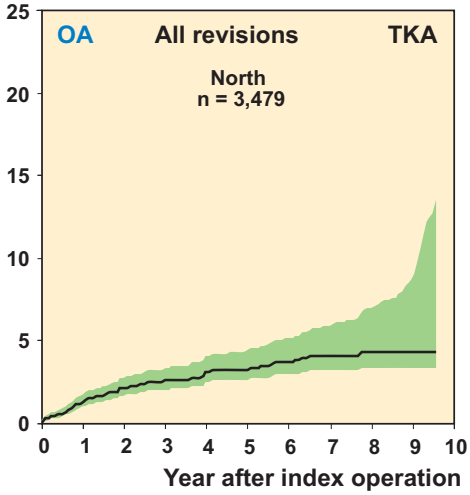
CRR (%)



North
Implants for primary TKA in OA 1991–2000

	Number	Percent
AGC	1,051	30,2
PFC	487	14,0
PFC Sigma	220	6,3
Duracon	445	12,8
LCS	318	9,1
Scan	151	4,3
F/S MIII	143	4,1
F/S ospec	33	0,9
Profix	138	4,0
MillerGalante2	89	2,6
MillerGalante unspec	71	2,0
Tricon	87	2,5
PCA-Mod	69	2,0
PCA	19	0,5
Kinemax	59	1,7
AMK	42	1,2
Synatomic	19	0,5
Other	42	1,2
Total	3,483	100,0

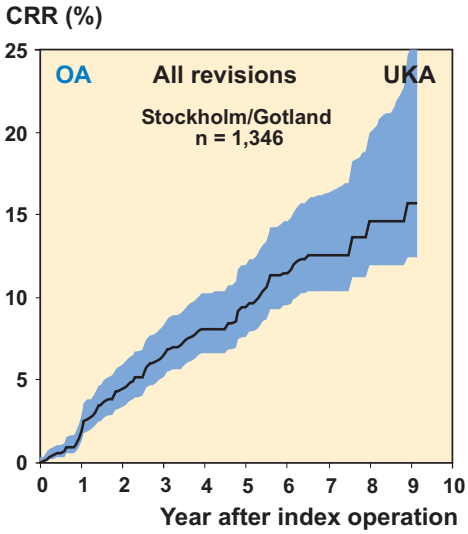
CRR (%)



UKA implants for osteoarthrosis in the regions 1991–2000

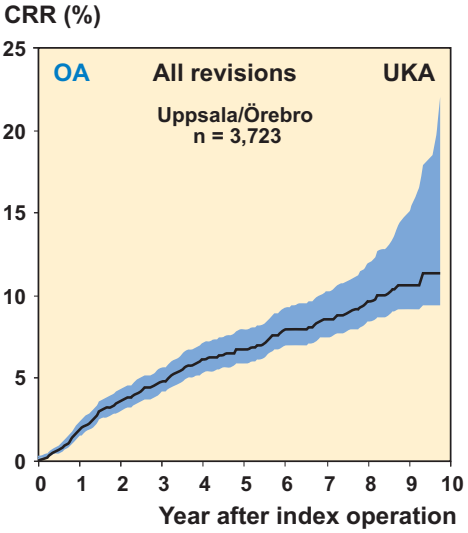
Stockholm + Gotland
Implants for primary UKA in OA 1991–2000

	Number	Percent
Brigham	621	46,1
MillerGalante	401	29,8
Oxford	115	8,5
Link	67	5,0
Genesis	53	3,9
Allegretto	24	1,8
Repicci (AARS)	20	1,5
Duracon	13	1,0
PFC	13	1,0
PCA	10	0,7
Marmor	8	0,6
Other	1	0,1
Total	1,346	100,0



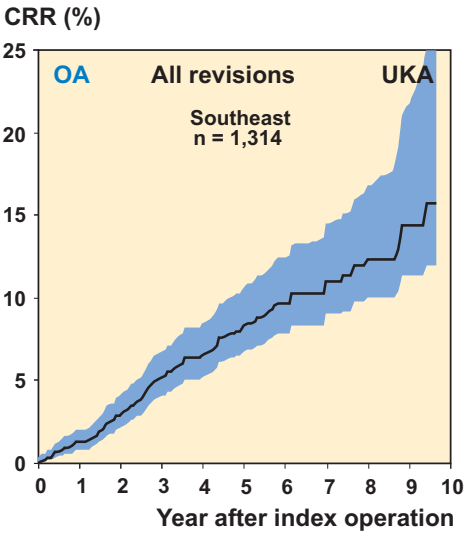
Uppsala-Örebro
Implants for primary UKA in OA 1991–2000

	Number	Percent
Link	2 011	54,0
Marmor	847	22,7
PFC	261	7,0
St, Georg	240	6,4
Duracon	99	2,7
Genesis	85	2,3
Oxford	62	1,7
PCA	45	1,2
Brigham	31	0,8
Allegretto	24	0,6
MillerGalante	14	0,4
Other	5	0,1
Total	3,724	100,0



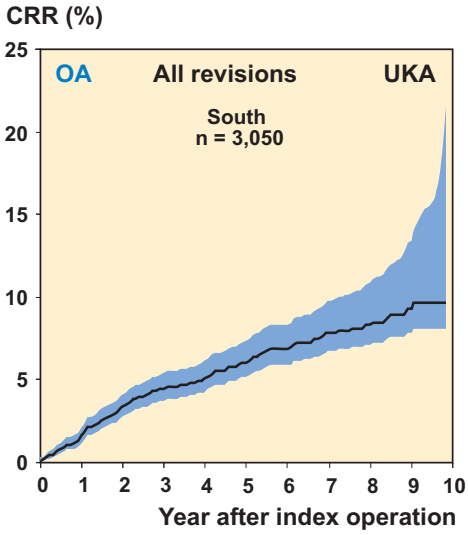
Southeast
Implants for primary UKA in OA 1991–2000

	Number	Percent
Link	337	25,6
Marmor	276	21,0
Brigham	198	15,1
Duracon	154	11,7
Genesis	89	6,8
Allegretto	64	4,9
PCA	58	4,4
PFC	57	4,3
Oxford	40	3,0
MillerGalante	30	2,3
St, Georg	6	0,5
Other	5	0,4
Total	1,314	100,0



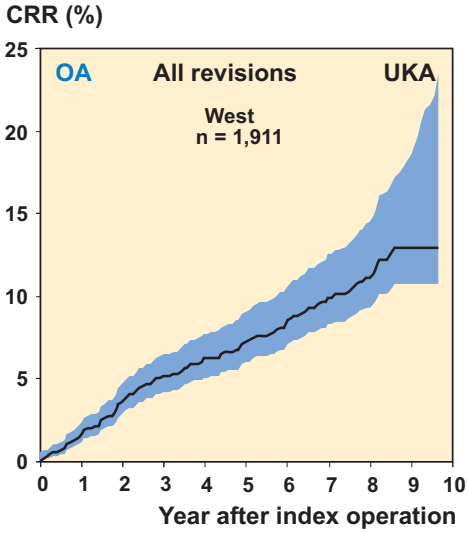
South
Implants for primary UKA in OA 1991–2000

	Number	Percent
Link	1,301	42,6
Marmor	591	19,4
Duracon	261	8,6
PFC	192	6,3
Brigham	128	4,2
Allegretto	118	3,9
MillerGalante	110	3,6
Repicci (AARS)	109	3,6
Oxford	101	3,3
St, Georg	85	2,8
Genesis	50	1,6
Other	5	0,2
Total	3,051	100,0



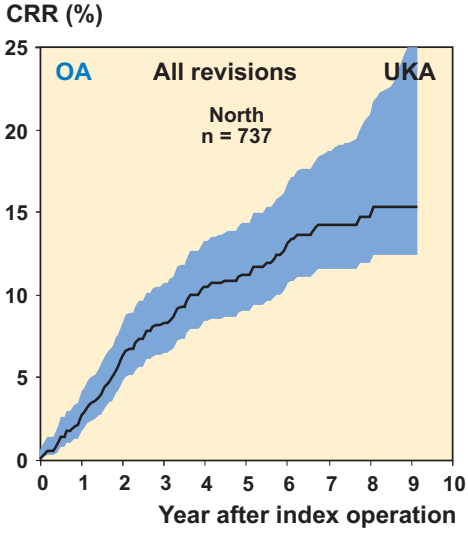
West
Implants for primy UKA in OA 1991–2000

	Number	Percent
Link	609	31,9
MillerGalante	528	27,6
Oxford	350	18,3
Marmor	153	8,0
Duracon	107	5,6
Repicci (AARS)	75	3,9
Allegretto	70	3,7
St, Georg	12	0,6
PCA	6	0,3
Other	1	0,0
Total	1,911	100,0



North
Implants for primary UKA in OA 1991–2000

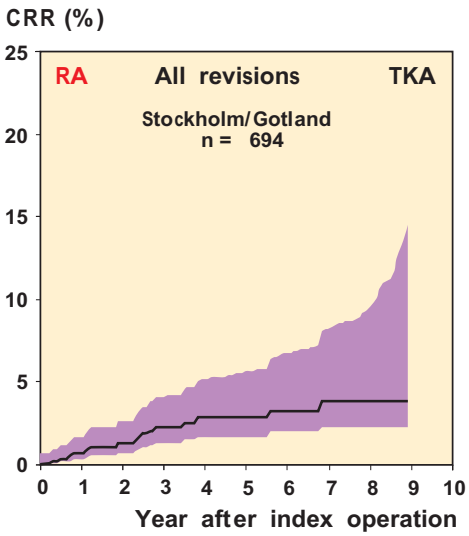
	Number	Percent
Link	461	62,6
Oxford	81	11,0
St, Georg	53	7,2
Marmor	48	6,5
MillerGalante	37	5,0
PFC	27	3,7
PCA	15	2,0
Duracon	15	2,0
Other	0	0,0
Total	737	100,0



TKA implants for Rheumatoid Arthritis in the regions 1991–2000

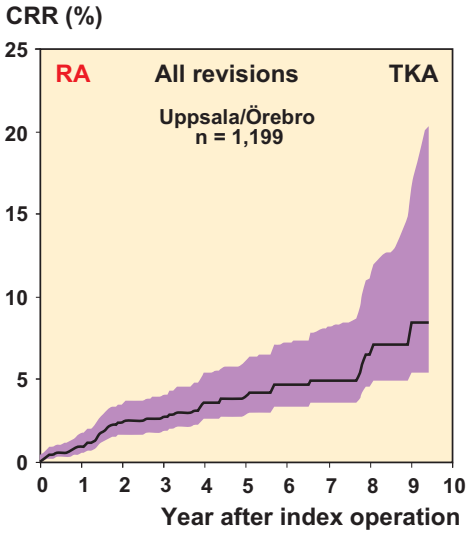
Stockholm + Gotland
Implants for primary TKA in RA 1991–2000

	Number	Percent
AGC	308	44,4
PFC Sigma	103	14,8
PFC	41	5,9
Kinemax	90	13,0
Duracon	86	12,4
F/S MIII	30	4,3
F/S unspec	12	1,7
PCA-Mod	19	2,7
Other	5	0,7
Total	694	100,0



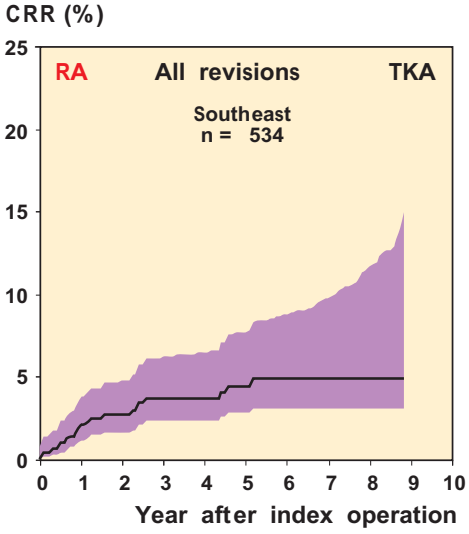
Uppsala-Örebro
Implants for primary TKA in RA 1991–2000

	Number	Percent
F/S MIII	355	29,6
Kinemax	264	22,0
AGC	220	18,3
Scan	162	13,5
MillerGalante2	61	5,1
MillerGalante unspec	25	2,1
F/S unspec	41	3,4
PCA	14	1,2
PFC	12	1,0
PFC Sigma	4	0,3
AMK	12	1,0
NexGen	10	0,8
Other	19	1,6
Total	1,199	100,0



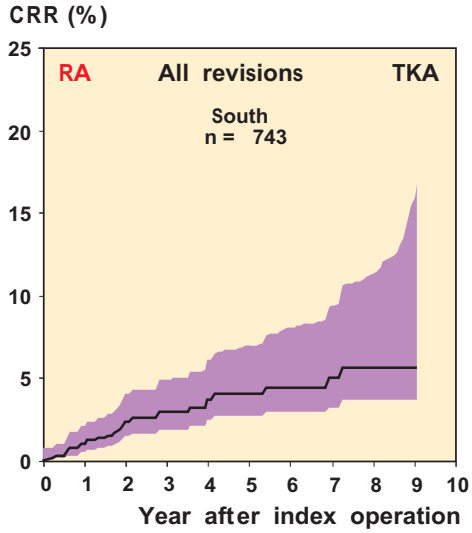
Southeast
Implants for primary TKA in RA 1991–2000

	Number	Percent
AGC	230	43,1
PFC	79	14,8
PFC Sigma	16	3,0
NexGen	66	12,4
MillerGalante2	35	6,6
MillerGalante unspec	23	4,3
Scan	31	5,8
Duracon	30	5,6
PCA-Mod	12	2,2
Other	12	2,2
Total	534	100,0



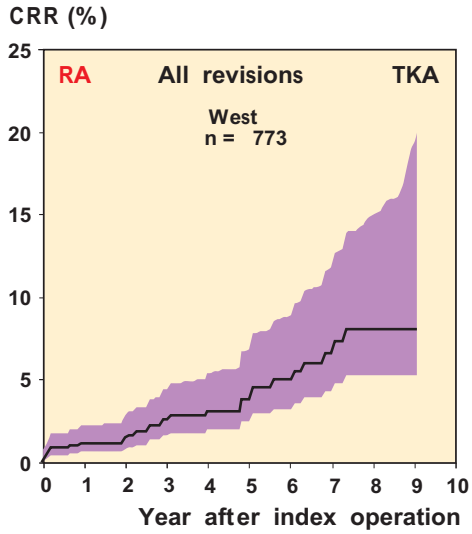
South
Implants for primary TKA in RA 1991–2000

	Number	Percent
Scan	307	41,3
PFC	142	19,1
PFC Sigma	50	6,7
AGC	101	13,6
Duracon	65	8,7
Kinematic	24	3,2
Synatomic	24	3,2
PCA-Mod	14	1,9
PCA	2	0,3
Other	14	1,9
Total	743	100,0



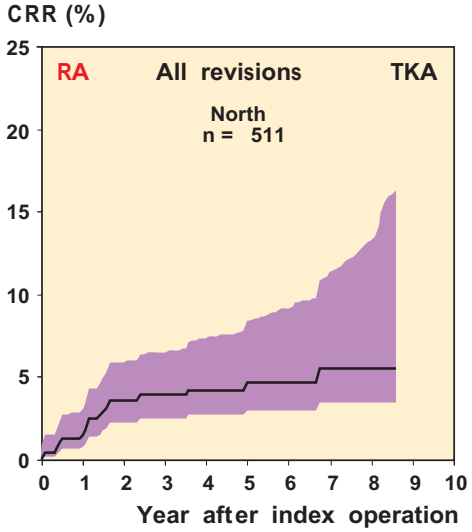
West
Implants for primary TKA in RA 1991–2000

	Number	Percent
AGC	308	39,8
F/S MIII	260	33,6
F/S unspec	63	8,1
Scan	88	11,4
Duracon	25	3,2
AMK	20	2,6
Other	10	1,3
Total	774	100,0



North
Implants for primary TKA in RA 1991–2000

	Number	Percent
Duracon	101	19,8
PFC	100	19,6
PFC Sigma	29	5,7
AGC	100	19,6
Tricon	31	6,1
MillerGalante2	29	5,7
MillerGalante unspec	12	2,3
PCA-Mod	29	5,7
LCS	28	5,5
Scan	13	2,5
Profix	12	2,3
Other	27	5,3
Total	511	100,0



Implants used for primary arthroplasty in 1991–2000

The registry usually uses the last 10-year period available for analysis to present the results of relatively modern implant types that have a reasonably long-term follow-up. It has to be noted that brands marked as unspecified usually consist of a mix of older and newer variants but where the reporting unit has not delivered a specified description. For some older unspecified brands this has resulted in improvment of results compared to prior analyses. The cause is probably that fewer implants of the older variants are becoming included in the analysis.

The risk of becoming revised is only one of many ways how differences between implants can be measured. Although not accounted for here, the type of the revision should also be considered. For example, the observed revision rate will increase when the use of a patellar button is deliberately avoided (see page 11) in favour of a secondary resurfacing of the patella, when needed.

On the following pages are CRR curves for TKA and UKA implants used for OA. As the table below shows, there are no significant differences for the models when used in RA, subsequetly no curves are disclosed.

Presently, we cannot evaluate the effect of mini incision on the results of UKA. However, it is noteworthy that the implants most often used with mini-incision have a higher CRR than the most commonly used Endo-Link. As even this implant is now becoming used with mini-incision the question may be answered later.

95% confidense interval for Risk Ratios for becoming revised. Cox regression is used to adjust for gender, age and year of operation.

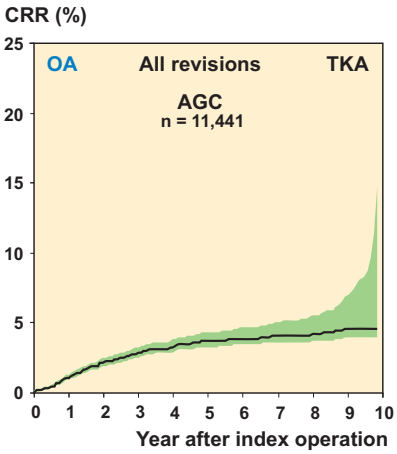
	OA / TKA n	95% CI
AGC	11,440	
F/S MIII	4,004	0,65–1,05
F/S unspec	418	0,83–1,99
PFC	2,448	0,97–1,55
PFC–Sigma	2,163	0,46–1,33
Duracon	3,084	0,61–1,06
Kinemax	2,688	0,94–1,51
Scan	2,102	0,97–1,60
MillerGalante II	898	0,91–1,83
Miller G. unspec	290	1,58–3,49
PCA–Mod	360	0,85–2,08
AMK	538	0,76–2,15
NexGen	857	0,04–0,65
LCS	376	0,62–1,97
Axiom	139	0,72–3,63
Profix	138	0,17–2,69
Synatomic	138	0,65–2,68
Other	544	0,81–1,84
Gender		0,85–1,12
Age		0,95–0,97
Year of operation		0,95–1,01

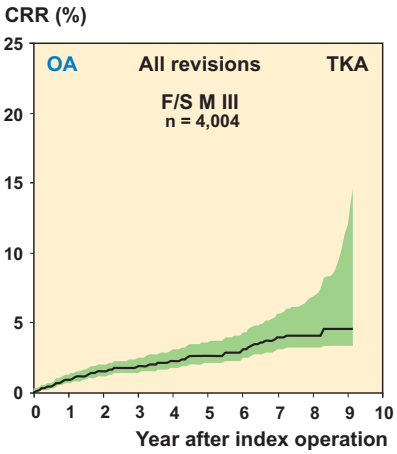
	RA / TKA n	95% CI
AGC	1,266	
F/S MIII	650	0,64–1,70
F/S unspec	116	0,42–2,37
PFC	374	0,34–1,34
PFC–Sigma	202	0,16–2,99
Duracon	309	0,26–1,43
Kinemax	364	0,62–1,93
Scan	601	0,39–1,18
MillerGalante II	128	0,41–2,60
Miller G. unspec	61	0,48–3,75
PCA–Mod	77	0,21–2,23
NexGen	73	0,36–6,50
LCS	30	0,11–5,99
–		
–		
–		
Other	125	1,07–4,15
Gender		0,56–1,15
Age		0,98–1,01
Year of operation		0,94–1,10

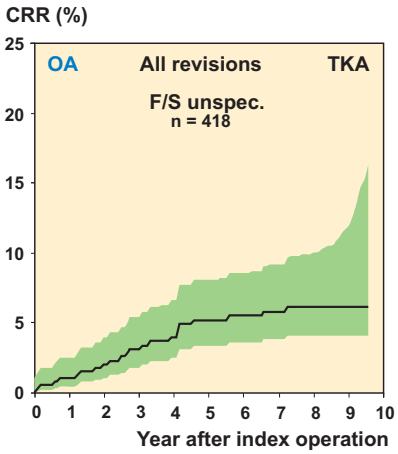
	OA / UKA n	95% CI
Link–Uni	4,784	
St Georg	396	0,43–1,11
Marmor/Richards	1,923	1,34–1,93
MillerGalante	1,120	1,09–2,09
Brigham	978	0,97–1,63
Oxford	749	1,15–1,95
Duracon	649	0,98–1,84
PFC	550	1,44–2,74
Allegretto	300	1,13–2,54
Genesis	277	0,47–2,14
Repicci (AARS)	204	1,31–3,14
PCA	135	2,64–5,39
–		
–		
–		
–		
Other	15	1,92–13,85
Gender		0,89–1,17
Age		0,95–0,96
Year of operation		0,93–1,00

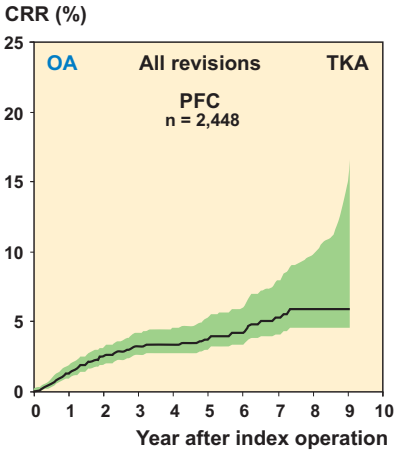
Significant difference

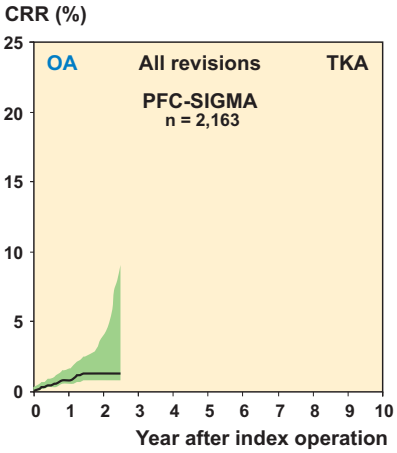
CRR for commonly used TKA implants in OA during 1991–2000

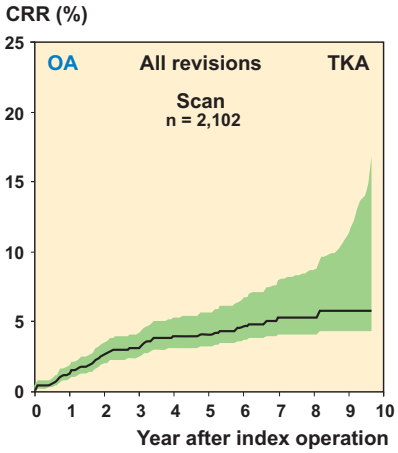


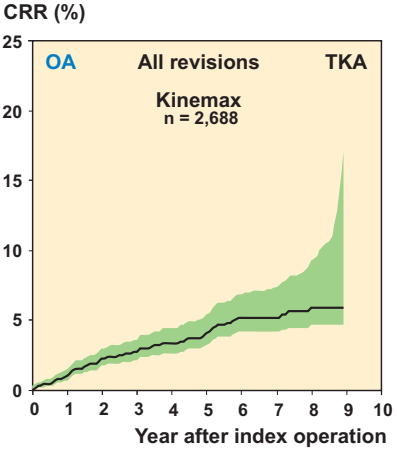


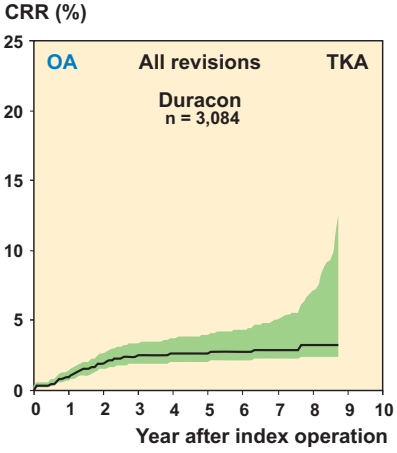


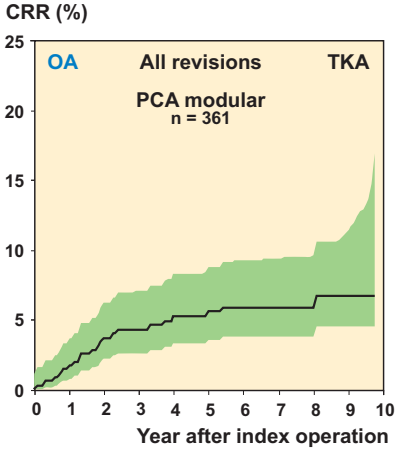


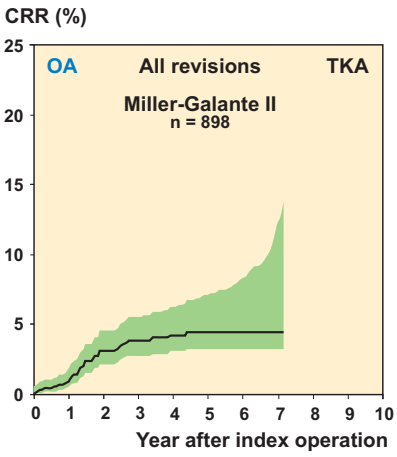


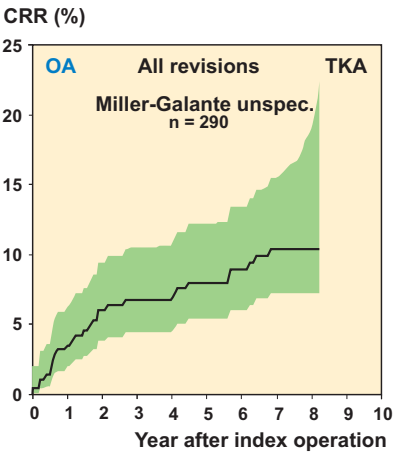


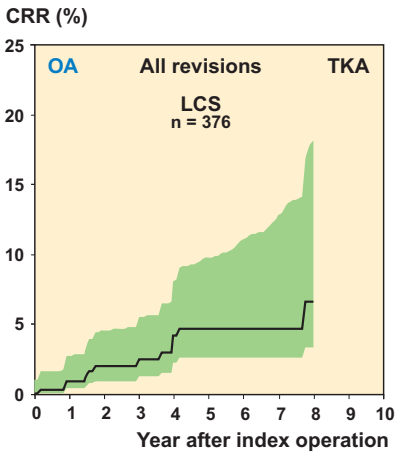


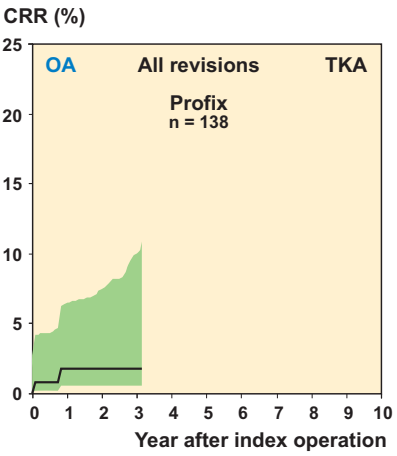


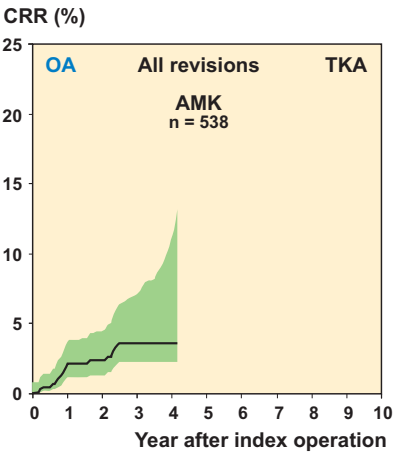


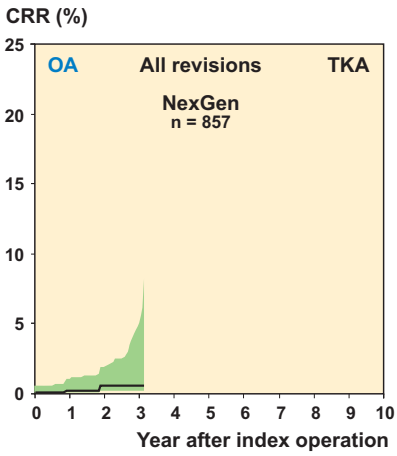

CRR (%)
OA
All revisions
TKA
Miller-Galante II
n = 898
Year after index operation

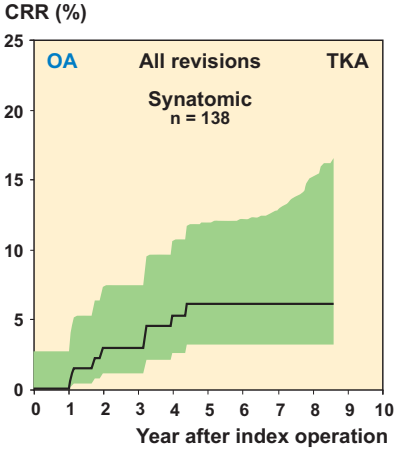

CRR (%)
OA
All revisions
TKA
Miller-Galante unspec.
n = 290
Year after index operation


CRR (%)
OA
All revisions
TKA
LCS
n = 376
Year after index operation

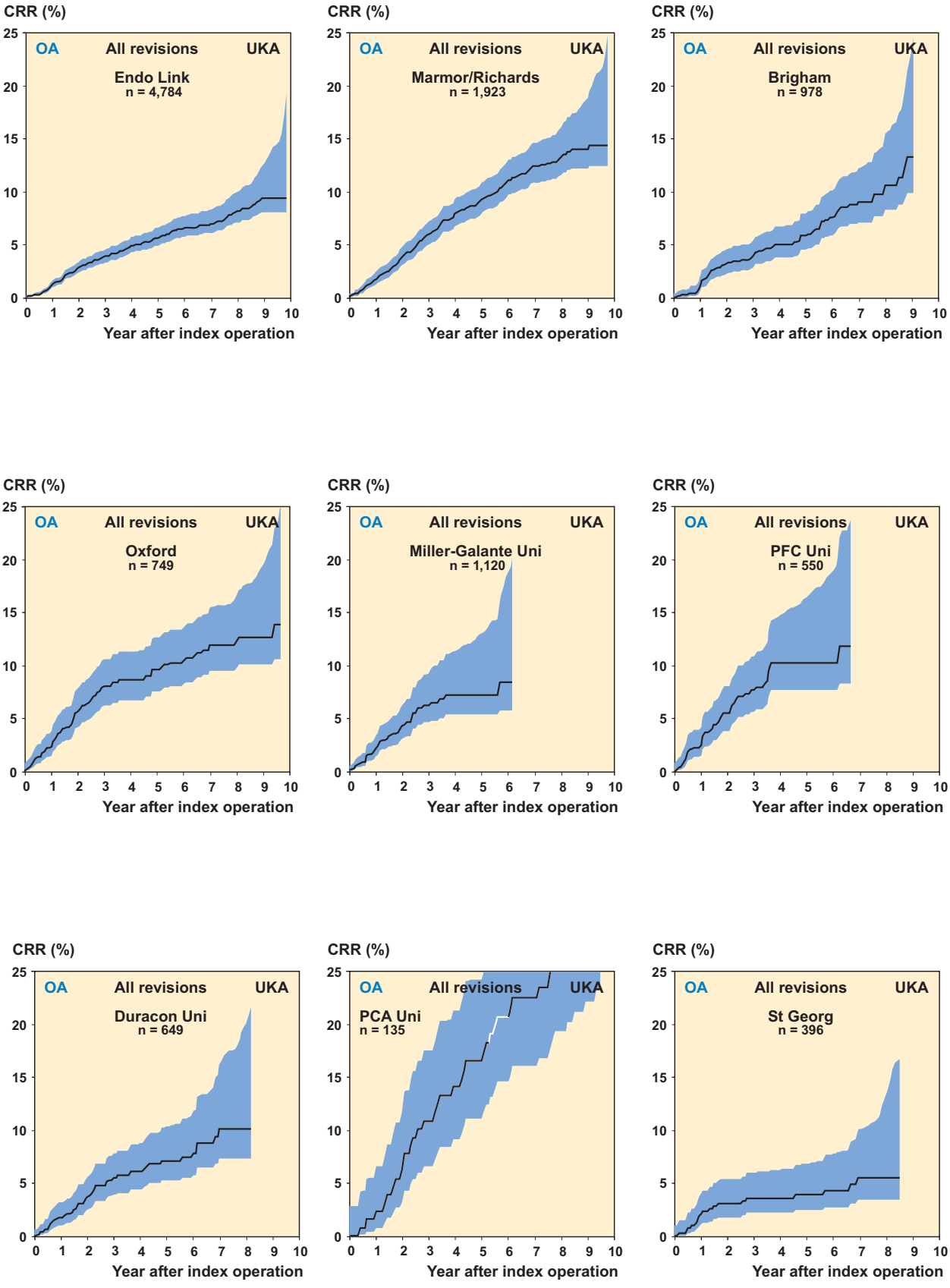

CRR (%)
OA
All revisions
TKA
Profix
n = 138
Year after index operation

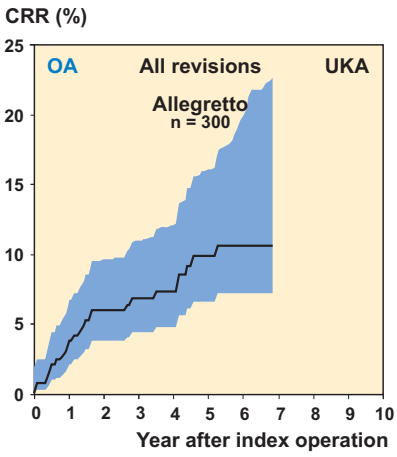

CRR (%)
OA
All revisions
TKA
AMK
n = 538
Year after index operation

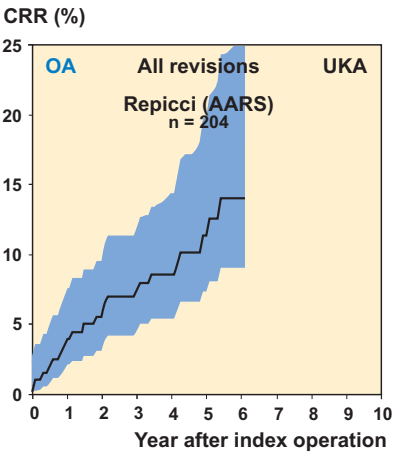

CRR (%)
OA
All revisions
TKA
NexGen
n = 857
Year after index operation

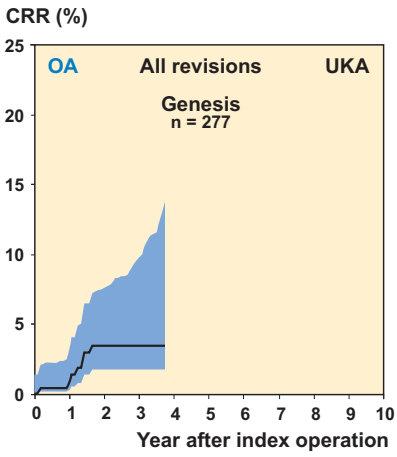

CRR (%)
OA
All revisions
TKA
Synatomic
n = 138
Year after index operation

CRR for commonly used UKA implants in OA during 1991–2000




CRR (%)
OA
All revisions
UKA
Allegretto
n = 300
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10
Year after index operation


CRR (%)
OA
All revisions
UKA
Repicci (AARS)
n = 204
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10
Year after index operation


CRR (%)
OA
All revisions
UKA
Genesis
n = 277
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10
Year after index operation