Appendix A

Outcomes instruments used in the clinical evidence for arthroscopy for the osteoarthritic knee

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Scale	Description	Validity	Reliability
American Academy of	• Site specific instrument	Х	Х
Orthopaedic Surgeons (AAOS)	• General pain and disability of lower limbs.		
Lower Limb Outcomes	with specificity for knee problems and		
Instrument*	documentation for joint replacement		
	• Lower limb: 20 items 6 scale + 6 individual		
	• Lower mild. 29 items, 0 scale + 0 individual		
	• Hip and Knee: 8 items, 2 scales		
AAOS Hip and Knee Outcomes	• Site specific instrument		Х
Support Instruments*	 General pain and disability associated with 		
	knee, with documentation for joint		
	replacement		
	• Core disability scale, 7 items		
	• Right and left knee pain scales 3 items each		
Ahlback scale	Classification system		
i inicacii sculo	 Grading of radiographic findings 		
	 Grada I: > alight reduction of the contilege 		
	• Grade I: \geq slight reduction of the cartilage		
	neight, Grade II. obliteration of the joint		
	space; Grade III: bone loss of \geq /mm		
	measured along the medial or lateral margins		
	of the joint from a line perpendicular to the		
	axis of the tibia and tangential to the		
	unaffected articular surface; Grade IV: bone		
	loss of $>$ 7mm measured as above; Grade V:		
	bone loss $>$ 7mm with subluxation		
Arthritis Impact Measurement	Disease specific instrument	Х	Х
Scales (AIMS-2)*	• Health status questionnaire to assess function.		
	work social support and problems due to		
	arthritis		
	• 78 items 12 scales		
Arthritis Self-Efficacy Scale	Disease specific instrument	x	X
(ASES)*	• Disease specific instrument	21	21
(ASES)	 Patient's perceived sen-encacy to cope with abranic arthritic 		
	• Subscale for pain, function, and other		
	symptoms		
Arthritis Impact Measurement	• Disease specific instrument	Х	Х
Walking and Bending subscale	• Five item walking-bending subscale from		
(AIMS2-WB)	AIM-2		
	 Scores 0-100; >=limited fxn 		
Arthrisis-specific SF-36	Disease specific instrument	Х	Х
(ASHI)*	• Applies arthritis-specific scoring algorithm to		
	the SF-36 to improve responsiveness of		
	instrument to changes in arthritis severity		
	• 2 summary measures 8 subscales		
Duke Arthroscopy Score	Arthroplasty outcome indices		
2 and manoscopy bear	 Pain and function pre- and post operatively 		
	 I and runction pic- and post-operatively Numerical rating system from 0.60 		
	• Numerical fating system from 0-60		
	• 0=no change; 1-20 fair result; 21-40= good		
	result; 41-60 excellent result		

EuroQol or EQ-5D Index*	 General health assessment General health status 16 blocks of items in 5 scales, 2 single item scales, visual analog 1-100 scale, self-rating 	X	X
Functional Assessment Scale*	 Disease specific instrument Standard balance in adults with osteoarthritis 		Х
Functional Status Index (FSI)*	 General health assessment Performance, i.e. level of function 3 multi-item scales, 6 single item questions 	Х	X
Health Assessment Questionnaire (HAQ)*	 Disease specific instrument Self-reported functional status 27 items for illness plus medical history 	Х	X
Hospital for Special Surgery Knee Score (HSS)	 Disease specific instrument Scale for pain and functioning Higher score= >pain and < functioning 	Х	
Kettlekamp Knee Scoring Scale*	 Disease specific instrument Pain and functional disability Possible scores 0-103, Higher score = < pain & > functioning 	X	
Knee Injury and Osteoarthritis Outcome Score (KOOS)*	 Disease specific instrument Pain and associated problems with daily activities 42 items, 5 subscales 	Х	X
Knee Society Clinical Rating System (AKS)*	 Arthroplasty outcome indices Knee joint and functional score for patient's ability to walk and climb stairs taking into account aging and declining condition 11 categories, 100 pt scale 		X
Knee Society Index of Severity for Failed Total Knee Arthroplasty*	 Arthroplasty outcome indices Linear model to facilitate physician judgment of severity of prognostic factors related to knee revision surgery. Decision modeling 	Х	X
Knee–Specific Pain Scale (KSPS)	 Site specific instrument Measures knee pain 12-item self-report; 0-100, high = pain 		Х
Lequesne Index of Severity for OA of the Knee (ISOA Knee)*	 Arthroplasty outcome indices Severity index for knee diseases for the OA knee. 11 items, scores 0-24, Higher score = > handicap 	Х	
Lysholm scale	 Site specific instrument Measure of functioning Maximum score = 100; modified version used in Hubbard (1996) max = 70. 	X	
Osteoarthritis Global Index (OGI 8.0)*	 Arthroplasty outcome indices Benefits of therapy and outcome of treatment 8 items, 3 scales 		

Outerbridge	 Classification system Severity of articular degeneration by compartment Grades I to IV; (Grade I: softening or blistering of the articular cartilage; Grade II: fragmentation or fissuring in an area <1cm; Grade III: fragmentation or fissuring in an area >1cm; Grade IV: cartilage erosion down to the bone) 		
Oxford Knee Score (Oxford- 12)*	 Arthroplasty outcome indices Outcome and functional change following total knee replacement 12 item, single scale 	Х	Х
Physical Functioning Scale (PFS)	 General health assessment Objective measure of functioning Seconds to walk 30m, climb up/down flight of stairs; >time=<fxn< li=""> </fxn<>		Х
Postoperative Knee Score for Pain	 Site specific instrument Pain, function, and range of motion Score 3-12 (3-5 points = poor, 6-8 points = fair, 9 or 10 points = good, and 11 or 12 points = excellent) 		
Medical Outcomes Study 36- item Short-Form General Health Survey (SF-36)*	 General health assessment Effects that could be direct function of disease and treatment Ten item physical-function subscale from SF-36, >score => functioning 	Х	Х
Medical Outcomes Study 36- item Short-Form General Health Survey for pain (SF-36-P)	 General health assessment Body pain 2-items pain subscale from SF-36 Scores 0-100;>score =< pain 	Х	Х
Visual Analog Scale (VAS)	 General health assessment Severity of pain 10 cm horizontal scale 	Х	Х
SMFA: Muscoskeletal Function Assessment/ Short Form*	 General health assessment General functional ability for patients with musculoskeletal conditions Composite function scale of 34 daily living items, 4 focused activity scales and a "bother" scale 		X
Subjective Knee Score*	 Site specific instrument General knee functioning during activities and a visual analog overall knee score Maximum score of 110 	Х	
Western Ontario & Mc Master Universities Osteoarthritis Index (WOMAC)*	 Arthroplasty outcome indices Clinically important changes in health status after surgical intervention 24 items in 5-point Likert and 100mm visiual analog format 	X	X

*Description found in American Academy of Orthopaedic Surgeons (AAOS) (2002), *Improving Muscoskeletal Care* in America (IMCA) Project: Osteoarthritis of the Knee, Chicago, Report.

Appendix B

Author/Year	Study Design/Burnose	Intervention/	Demographics	Results	Comments
Dervin, et al, 2003	Prospective case study with 2 independent evaluators. To develop a prediction rule with use of common clinical criteria to define which patients with symptomatic osteoarthritis should be offered arthroscopic debridement resulting in sustainable improvement in health-related quality of life	All patients had arthroscopic debridement, which included resection of unstable chondral flaps and meniscal tears. It did not include abrasion. All patients assessed by 2 independent groups of surgeons, evaluated preoperatively using standardized assessment of clinical symptoms and signs and plain xray Primary outcome: Pain Outcome measures: WOMAC and SF- 36 Quality of life by self- administered instruments assessed preoperatively and postoperatively and postoperatively at 6,12,24 months. Success if improvement in score >20%	N=126 patients (156 referred, 126 entered) Age: 40-75, mean 61.7 Sex: 67 female 59 male All patients failing medical management of knee OA were referred. Exclusion: inflammatory or traumatic OA Medical management included: oral or topical analgesics, NSAIDS, and intra- articular injection of hyaluronate and/or cortisone	56% (n=44) clinical reduction in pain per WOMAC at 2 years MDs were poor at predicting which pts would improve with arthroscopy. Inter-rater reliability: kappa = 0.27 Factors associated with improvement: *medial joint- line tenderness (p=0.01) *positive Steinman Test (p=0.01) *unstable meniscal tear at arthroscopy (p=0.01) Unstable meniscal tear at arthroscopy (p=0.01) Unstable meniscal tear was the only variable associated with improvement in all 3 WOMAC subscales Giving way and locking were poor discriminators for outcome and seen in <50% of the	The mechanical symptoms of giving-way and locking were especially poor discriminators and were seen in less than ½ the patients. The inter-rater reliability was poor in predicting which patients would have sustained improvement post arthroscopy. Did not compare to placebo

Author/Year	Study Design/Purpose	Intervention/ Outcomes	Demographics	Results	Comments
				patient population.	
Fond, et al, 2002	Case series, retrospecitve chart review. To asses whether arthroscopic debridement of a degenerative knee improves patient satisfaction and function.	Pts scoped by same surgeon. Debridement included: Debridement of meniscal lesions, limited thermal stabilization of chondral defects, removal of impinging tibial, subpatellar & notch osteophytes, partial synovectomy, and lateral retinacular release. Charts reviewed. Pre-op symptoms classified into mechanical (local pain and tenderness, giving way, locking) or loading symptoms (pain with weight bearing, poorly localized pain) Primary outcome: Modified HSS scoring scale used for pre-op and post -op symptoms.	N=36 pts with f/u at 2 and 5 years Mean age: 65 years Mean duration of symptoms: 60 months Selection criteria: All pts undergoing arthroscopy for OA and available for f/u Exclusion: major malalignment (not defined)	Mean pre-op HSS score=29.2, Mean post-op @ 2 years=48 Mean post-op @ 5 years=43.2 Results correlated with pre-op range of motion. Poor outcomes associated with longer duration of symptom, tricompartment disease, low mean pre-op HSS scores, and > 10 degrees of extension deficit pre-op.	No data tables given. No results of regressions shown. Many pts had TKR recommended before they entered this trial. Malalignment not defined

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
Moseley et al,	Masked placebo-	3 arms: Placebo	N=180pts (144/324	No difference	Possible
2002	control RCT	surgery (control)	declined)	in pain relief	selection bias
		vs. debridement	60 in each arm	or function	(44% refused
	To evaluate the	vs. lavage		between	participation)
	efficacy of	D 1 1 1	Mean age: 52.3 SD	placebo and txt	D :
	arthroscopic	Debridement	11.3	groups	Primary
	surgery of the	Included: Chandranlasty	2 groups had 99 5		endpoint
	nain and	loose body	96.6% male	KSIS @ 1	unvalidated
	improving	removal trimming	90.070 maie	Placebo	instrument
	function in pts	torn/degraded	Selection criteria:	48.9	motrument
	with	meniscal	Eligible if 75 or	Lavage	VA sample of
	osteoarthritis	fragments,	less, OA of knee	54.8	all men
	(OA)	meniscus	defined by		
		smoothed to firm,	American College	Debridement	
		stable rim.	of Rheumatology (51.7	
			ACR), moderate	AIMS @ 1	
		Lavage: at least 10	knee pain despite	year:	
			Ty y 6mo no	Flacebo	
		Placebo: simulated	arthroscopy in last	J4 Lavage 57	
		debridement	2 years	Lavage 57	
		surgery: pts	2 years	Debridement	
		prepped and	Exclusion: severity	55	
		draped,	grade >9, severe		
		tranquilizers and	deformity, serious		
		opiods used to	medical problems		
		sedate, 3 1-inch			
		incisions made			
		Primary: Pain in			
		knee at 24 months			
		assessed by KSPS			
		Secondary:			
		AIMS2-P, SF-36-			
		P, AIMS2-WB,			
		SF-36-PE, PFS.			
		Dogulta stratified			
		hy severity			
Wai et al	Retrospective	Secondary data	N=14 391	1330 TKR	Canadian study
2002	reaspective	analysis	unilateral knees.	w/in 1 vr post	Sumanun Study
	To evaluate			- J- Post	Study does not
	patterns of	Primary outcome:	Mean age: 62.4	1146 TKR	address efficacy
	arthroscopic	receipt of elective	-	w/in 3 yrs post	of procedure.
	knee	debridement and	7181 women		
	debridement use	rate of TKR	7210 men	TKR increases	Possible placebo
	& outcomes	G 1	10 740	with age	effect
	tollowing	Secondary	15,/43 no	Highor rates of	
	procedure for	outcome: pt-	comorbialty	arthroscopy	
	degenerative	outcomes	Inclusion: All	arunoscopy associated with	
	arthritis in	following	Ontario users $\geq =50$	higher rates of	

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
	arthritis in people > 50 years of age in the province of Ontario, Canada	following debridement	Ontario users >=50 w/ elective arthroscopic knee debridement btw 92-96, from 16 district hospitals Exclusion: inflammatory arthritis, RA, same day bilateral knee operations w/ L&D	higher rates of early TKR if pts >=60 years of age 478 repeat debridement & lavage w/in 3 yrs 274 pts. had documented complications.	
Shannon et al, 2001	Retrospective, case series To determine the results of arthroscopic lavage with limited joint debridement in pts with symptoms of mild-moderate osteoarthritis of the knee and establish the duration of symptom relief.	Debridement included: removal of loose bodies, partial meniscal resection F/u 4-year period based on 1 mo post-op visit Primary outcome: symptom relief post lavage & debridement Secondary outcome: identification of pre-op variables predicting outcome Duke arthroscopy score used to assess pain and function pre/post op.	N = 54 (55 knees) 30 women 24 men Mean age: 61 years Mean f/u 29.6 mo Inclusion: all pts with OA, failed conservative treatment, symptoms greater than clinical/xray findings, but not severe enough for TKR. Exclusion: Diagnosed meniscal tear/loose body	complications. 37 cases improved (26 good/ excellent and 11 fair) 18 cases had no change Avg. duration pain relief: 25.5 mo 85% with Outerbridge. I, II improved 57% with Outerbridge. III, IV improved	Incidental findings of meniscal tears and small loose bodies are not unusual. Possible placebo effect Small sample size
Kalunian et al, 2000	Multi center RCT, double blind To determine whether full volume saline lavage vs. minimal volume lavage changes clinical and functional outcomes in pts	Full volume lavage: 3000 ml saline Minimal lavage: 250 ml saline Primary: change in aggregate WOMAC score Secondary: change in WOMAC subscore for pain	N=90; 41 full vol irrigation, 49 minimal Pts with full vol irrigation had more swelling at baseline Inclusion: >40 yr, knee pain for <=10yrs, unsatisfactory pain relief despite PT	No change in aggregate WOMAC score Change in WOAMC subscore for pain and VAS for pain only.	No reference to mechanical symptoms Surgeons not blinded Most changes not statistically significant

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
	with early knee osteoarthritis	and in pain VAS.	and meds, minimally abnl xray (Kellgren/Lawrence grades 0-2, meet ACR criteria for OA.) Exclusion: BMI>35, other joint disease, recent steroid injection, others		
Harwin, 1999	Retrospective, case series of one orthopedic surgeon To identify predictors of patient satisfaction associated with patient selection for arthroscopic knee debridement	"Standard" arthroscopic debridement*, plus post-op ROM and strengthening exercises, supervised physical therapy and various NSAIDS Three groups based on degree of varus or valgus alignment on standing AP xrays: Grp I: 0° c nl joint space Grp II: ≤5° c narrowed joint Grp III: >5° c more severely narrowed joint space Primary outcome: % satisfaction rated by the pt's self-reported post- op assessment of: "Are you better, unchanged or worse" Secondary: Pre and post-op HSS knee scores	220 pts selected from total of 2730 pts who had knee arthroscopy, of which 30/220 pts lost to follow-up N = 204 knees (from the remaining 190 pts who were actually followed & reported) * Grp I: 57 knees * Grp II: 102 knees * Grp II: 102 knees * Grp III: 45 knees 109 women, 81 men Mean age: 62.1 yrs (32-88) Mean follow-up: 7.4 yrs (ranging from 2-15 yrs) Selection criteria: From all pts with knee arthroscopy between 1980 and 1993, retrospective chart review performed for the subset of pts found to have areas of fibrillated cartilage with exposed bone who underwent arthroscopic knee debridement	Percent of knees reported by pts at mean of 7.4 yrs after AD: * Grp I: 84.2 – better; 12.3 - unchanged; 3.5-worse * Grp II: 67.6 – better; 23.5 - unchanged ; 8.9-worse * Grp III: 26.7 – better; 26.7- unchanged; 46.6-worse * All knees (n=204): 63.2 – better; 21.1- unchanged; 15.7-worse Secondary: Mean change in pre-op and post-op HSS knee scores not significantly different for those pts who were either better or unchanged post-op, versus those pts who were worse post-op	Wide range of follow-up Process of assessing outcomes unclear Questionable validity of primary outcome measure Potential wide variability in treatment intervention

Author/Year	Study Design/Purpose	Intervention/ Outcomes	Demographics	Results	Comments
	Design/1 urpose	Outcomes			
McGinley et al, 1999	Retrospective case/chart review of cases from one surgeon To determine long term results of debridement and lavage	Debridement included: meniscal tear resection, nonaggressive shaving of frayed articular cartilage, drilling of medial femoral condyle, loose body removal, lateral release Primary outcome: satisfaction (scale 0-10; 10="completely satisfied"), return to functioning, delay/avoid TKR Assessments made 10 years after intervention	N=77pts (91/191 knees) Mean age: 62.6 (55-82) Inclusion: Pts chose D&L over TKR, Outerbridge grade 4 in at least 1 compartment	TKR in 30/90 knees Average time to TKR =6.7 yrs. Mean pt satisfaction: 8.6	Unvalidated scale used to assess satisfaction and no example of questions from survey/scale
Ravaud et al, 1999	Multicenter, prospective RCT of 6 month duration at 6 sites in France To evaluate efficacy of joint lavage and intra- articular steroid injection, alone and in combination, in pts with symptomatic knee OA	4 Treatment groups: * Intra-artic placebo (IA-P) * Intra-artic steroid (IA-S) * IA-P plus joint lavage(JL) * IA-S plus joint lavage(JL) Primary outcome: % change in severity of pain evaluated on visual analog scale (VAS) from baseline to week 24 "Clinically relevant improvement" defined as >30% change in VAS	 98/128 eligible pts were randomized and 93/98 pts treated as allocated N = 93 pts * 26 pts for IA-P * 23 pts for IA-S * 21 pts IA-P plus JL * 23 pts IA-S plus JL 66 women, 32 men Mean age ranged from 63-67 yrs in the 4 treatment groups 	Pts with joint lavage had sig. improved pain VAS scores at wk 24 versus pts with placebo (p=0.02). % with clinically relevant change in pain @ wk 24: VAS (placebo 2%) Lavage 36%; p=0.02 Steroid 21%; p=0.31 Lequenes (% change from baseline at 24- wks) Lavage 21%; p=0.857 Steroid 20%; p=0.863	30/128 eligible pts not randomized 23/98 of randomized pts withdrew due to ineffective procedure (19) or were lost to follow-up (4) Twice as many withdrawals in IA-placebo group (10/28) as in other groups

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
Linschoten et	Case series	Preliminary	Retrospectively	38/56 (68%)	Non-validated
al, 1997		diagnostic	selected from 68	"good"	outcome
	To determine	arthroscopy	knees in 67 pts	outcomes	measure
	which factors	followed by	meeting from chart	18/56 (32%)	
	influence the	arthroscopic	review of 169 pts	"poor"	Potential wide
	outcome of	debridement	who had knee	outcomes	variability in
	arthroscopic	individualized	arthroscopy from		treatment
	debridement.	according to the	July 1985 to	Likelihood of	intervention
		findings in each	January 1988	successful	
		case		outcome said	7 of 56 knees
		Primary outcome:	N = 56 knees (in 55	to be	(12.5%) in
		Self-reported	pts)	"significantly	patients with
		"Good" outcome		and directly	rheumatoid
		defined as:	27 men, 28 women	related to the	arthritis
		* symptomatic		condition of	
		improvement	Mean age: 62.5 yrs	the articular	
		* activity level	(41-/9)	cartilage."	
		equal to or better	Moon f/u: 40	Logaof	
		than before	mean $1/u$. 49	LOSS 01	
		* satisfaction with	$\frac{11011018}{24-07}$	to the bare	
		procedure		to the bale	
		* willingness to	Inclusion criteria:	medial	
		do procedure again	* >40 years	compartment	
		do procedure again	* pre-op diagnosis	involvement	
		Poor outcome	of OA or	associated with	
		defined as:	rheumatoid arthritis	poor outcome	
		* any outcome	with associated	1	
		falling short of	degenerative	No sig.	
		criteria for good	changes	relationship	
		outcome	* failure to respond	between the	
		* a good outcome	to conservative	procedural	
		that deteriorated	therapy	outcome and	
		within 24 months	* arthroscopically	the presence of	
		post-procedure	confirmed	meniscal tears,	
		* any subsequent	degenerative	loose bodies or	
		surgery on the	changes	tat pad	
		same knee	Explusion oritoria	aonormalities	
			* arthroscopy for	Avial	
			traumatic tears of	alignment was	
			meniscus or	alignment was	
			cruciate ligament	determined in	
			* preliminary	33/55 nts	
			diagnosis of	* In $20/33$ nts	
			degenerative	with	
			arthritis not	satisfactory	
			corroborated by	alignment (≤	
			subsequent	4° tibiofemoral	
			arthroscopy	angulation),	
				15/20 (75%)	
				obtained	
				"good"	
				outcomes	

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes	0 1		
				* In 13/33 pts with varus- valgus malalignment (> 4°angulation), 7/13 (54%) had "good" outcomes	
11.11.1.1007	D (7(1	* 1 22	D 1 1
Hubbard 1996	Prospective, unmasked RCT To compare arthroscopic debridement with washout in pts with clearly defined levels of degeneration of the articular cartilage of the medial femoral condyle	Control= washout group. 3 L saline Debridement- resection of loose cartilage. No menisectomy performed Primary outcome: pain and symptom relief. Lysholm score used, modified to exclude stability score, maximum score =70 Recorded as success or failure denoting the absence or presence of pain	76 knees: 40 debridement 36 washout (aka lavage) Mean f/u for 58 knees was 4.5 yrs (all original 76 followed for 1 year) Inclusions: all pts w/ arthroscopic surgery for degeneration of articular cartilage of the knee. All with unremitting symptoms in knee for 1 yr prior. Excluded: knees with any additional intra-articular pathology beyond medial femoral condyle Outerbridge Grade	 * 1 yr: 32 debridement and 5 washout pain free * 5yr: 19 debridement and 3 washout pain free. Mean improvement by modified Lysholm: 28 for debridement @ 1 yr; 21 @ 5 yr. Sig. diff btw debridement & lavage groups 	Debridement limited limited to medial femoral condyle grade 3 or 4 Outerbridge. Might be useful for minimal arthritic changes without meniscal changes.
Yang et al 1995	Retrospective chart review of arthroscopic surgery performed by one surgeon from July '89 to July '93 To determine	Intervention: Knee arthroscopy, to include some of the following: lavage to remove intra-articular debris and loose bodies, debridement of cartilaginous	N =103 pts with 105 knees (selected from "greater than 1000" arthroscopic procedures of knee) 20 women, 83 men Mean age: 64.2 yrs (60-81)	Outcomes of post-op knee pain score: * 21 (20%) excellent knees * 47 (44.8%) good * 34 (32.4%) fair * 3 (2.9%)	Short follow-up Non-uniform arthroscopic intervention, with probable wide variability in treatment No published
	success of	defects and		poor	reference or
	arthroscopy	unstable flaps,	Mean follow-up:	Cooder	validation of 12
1	measured by	ariting of	11./ months	Good and	point post-op

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
Author/Year	Study Design/Purpose standard scoring system, and correlate preoperative and intraoperative findings with outcomes	Intervention/ Outcomes chondral defects, and synovectomies No meniscal repairs or abrasion arthroplasties were performed. Primary outcome: 12-pt post-op knee score for pain, function and ROM, ranging from 3-5 points for poor to 11-12 points for excellent	Demographics (ranging from 6-60 months)	Results excellent knees (64.8%) considered surgical successes The most significant predictors of good outcomes were preoperative mechanical symptoms, (i.e., those resulting from loose bodies or flap meniscal tears; only mild articular degeneration	Comments knee score utilized as study's primary outcome measure
				visible at	
	P. 677			arthroscopy)	
Chang et al 1993	RCT at two sites To compare arthroscopic surgery and closed-needle joint lavage in pts with non- end-stage OA	Intervention: meniscal debridement; removal of proliferative; synovium; excision of loose cartilaginous fragments; continuous saline lavage. Control group: only tidal lavage (1 L) Both groups additionally received PT and only non-narcotic analgesia Primary outcomes evaluated at baseline, 3 and 12 months: * Knee range of motion * Knee joint swelling	N = 32/200 pts randomized 18 pts received arthroscopic surgery: * 13 women, 5 men * Mean: 61 yrs 14 pts received joint lavage: * 10 women, 4 men * Mean: 65 yrs Inclusion criteria: Persistent knee pain for longer than 3 mo despite conservative medical and rehab management restricting activities to a level unacceptable to patient Exclusion criteria: Knee surgery	No sig. difference in any of the clinical, functional or global outcomes between the arthroscopic surgery group and the non- operative lavage control group at 3 months Sig. changes in only 2 of the 10 primary outcomes. The only cartilage, bone or soft tissue abnormalities possibly associated with successful arthroscopic surgery were	Possible selection bias: 90 pts "retrospectively" fulfilled entry criteria and "about 45" of the 90 had surgery outside of the study In discussion, the authors noted the following: * Improvement in arthroscopic group increased by tx of tear of lat meniscus or anterior 2/3 of medial meniscus * Study couldn't address whether arthroscopic surgery more effective for this

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
	Design/Purpose	* Knee joint tenderness * Pt self-reported pain * AIMS-2 * 50 foot walk time * Pt overall well being * Doctor's global assessment * Direct medical costs * Indirect medical costs	within 6 months of study, or class 4 xray findings	tears of the anterior 2/3 of the medial meniscus or any lateral meniscal tear Radiologic class did not correlate with outcome, and none of the clinical signs or symptoms collected (including locking, giving way or positive McMurray's sign) predicted the presence or absence of meniscal	subgroup of pts * Unable to determine pre-op intra- articular pathology in patients randomized to lavage * Pts with meniscal findings couldn't be identified pre-op by any set of clinical sign or sxs

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes	_		
Merchan, et al, 1993	Prospective, randomized To determine relative benefit of limited debridement with partial menisectomy.	Intervention: limited debridement with partial Debridement included resection of synovial tissue; removal of degenerative menisci, osteophytes, and loose bodies; and limited debridement of cartilage defects. Control: no procedure (non operative group). All had PT. Non-operative group had NSAIDS and a decrease in intensity of activities affecting the painful knee Primary outcome: HSS Knee Rating Score. Success= increase in the post-op score of at least 10 pts. Failure=score decrease by 10 points.	Knee score difference greater in arthroscope group. 85% improved post operation at 1 year. 63% of the non- operative group improved at 1 year.	Author believe main indication for scope is for treatment of other problems that coexist with OA, commonly meniscal tear. Relationship between OA severity and functional results post- debridement is not clear.	

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
Bonamo, et al 1992	Retrospective case-control, unmatched Determination of prognostic factors for pts over 40 undergoing arthroscopic partial menisectomy and limited debridement of coexisting degenerative articular surface erosion. Control group did not have clinically significant articular degeneration.	Pts had limited debridement with partial menisectomy. Procedure included: partial menisectomy, loose body removal, limited debridement of articular surface	N=181 (246 entered, 181 completed f/u questionnaire).Pts further divided into 2 groups related to severity of OuterbridgeLess severe Group I (Outerbridge I&II), N=63More severe Group II (Outerbridge III&IV), N=118 Group II had mechanical symptoms.Both groups had 2- 5% of pts with malalignmentInclusion: symptomatic, arthroscopically verified meniscal tear unresponsive to conservative treatment (not defined),Exclusion: previous knee surg, ligament deficiency, systemic arthritis, osteonecrosis, chronic functional disability of any kind.	Group I had greater pt satisfaction (94% (N=59)) than more severe Group II (70% N=82). No relationship between malalignment and outcome. Pts in Group II with more significant arthritis had poorer results. Women had poorer outcomes	Un-matched Subjective improvement measures
1992	To evaluate the effect of arthroscopic lavage and debridement of	debridement with osteophyte removal. Debridement included: Excision of loose	Age: 38-69 Selection criteria: Pts in orthopedic practice.	improvement in muscle strength or function of the affected leg	generalizability because of small sample size. Possible selection bias
	the osteoarthritic knee.	articular cartilage, degraded margins	Symptoms scored with British		

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
		of medical and lateral menisci smoothed out. Lavage: 1 litre of saline through all compartments of joint. Primary outcome: muscle strength in affected quadracepts compared to non- affected knee. Measured by biopsy and blinded	Orthopaedic Association Scale as well as a modified Outerbridge Scale. Exclusion: age > 70, >20 degrees varus/valgus deformity		
		physical therapy			
Katz et al 1992	Retrospective review	Intervention: APM	N = 105 pts (of 125 pts who underwent	Multivariate associations	Possible patient selection and
	To identify clinical and demographic factors associated with worse outcomes after arthroscopic partial meninsectomy (APM) using multivariate analysis	Primary outcome: Functional status as assessed by current postoperative score on the physical activity scale of the SF-36 Predictor variables abstracted from hospital records and operative notes, as well telephone questionnaires and interviews: * Medical history data including preoperative symptoms, prior knee surgery, extent of comorbidities * Impairment data including clinical examination, radiographic findings and	14 pts lost to follow-up and 6 refused to participate (of original 125 pts who underwent APM) Number of men & women not reported, but most said to be white males Mean age: 39.5 yrs (SD 13.4) Inclusion criteria: Pts undergoing APM from July 1988 to June 1989, who were over 18 yrs of age at time of surgery Exclusion criteria: Unable to complete interviews in English	primary outcome (post- op functional status) and predictor variables: Three predictor variables were independently associated with worse postoperative functional status on SF- 36 ($p \le 0.05$): * Worker's compensation ($p = 0.003$) * Pre-op SF- 36 physical activity score ($p = 0.007$) * Presence of grade III or IV cartilage damage on Cascells scale ($p = 0.05$)	Young pts w/ questionable generalizability to Medicare beneficiaries Possible confounders include additional surgical procedures (concomitant ACL repairs), utilization of written xray reports without review of original films, and no reliable info on pre or postop meds and PT

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
		functional status			
		abstracted			
		* Pre-op functional			
		status on SF-36			
		* Knee specific			
		disability			
		* Specific			
		meniscus involved,			
		presence of ACL			
		or non			
		degenerative tear			
		and presence of			
		cartilage damage			
Wouters et al	Retrospective	Wide variability of	N = 371 pts whose	Results of	Descriptive
1992	chart and	indexed	pre-op xrays were	"Good > 2	study with no
	radiograph	arthroscopic	reviewed (from	years" by	statistical
	review, plus	procedures,	total of 551 pts	radiographic	analysis
	personal	including	treated, of whom	assessment of	
	interview	meniscectomy	441 available for	alignment (N =	Follow-up and
		with or w/out	follow-up &	371):	outcomes were
	To determine	debridement,	personally	* 60/98 (61%)	subjective
	results of	debridement of	interviewed)	varus	NT :0
	arthroscopy and	one or more	N 70	* 180/231	Non-uniform
	define its role in	compartments	Mean age: 58 yrs	(/8%) normal $(/8%)$	arthroscopic
	degenerative	articular cartilage	(28 - 92)	valous	with wide
	arthritis of knee	abrasion	Mean follow-up	valgus	variability in
	narticularly	arthronlasty and	approximately 4	Results of	treatments
	selection of pts	lavage	vears (ranging from	"Good > 2	u cutilicitto
	for knee	e	2-9 years)	years" by type	Authors noted
	arthroscopy	Primary outcome:		of procedure	indications for
		Length of time pts	Classification of	(N = 441):	each type of
		feel they had relief	alignment on pre-	* 84/103	treatment and/or
		from symptoms	op radiographs:	(82%) 1 cmpt	procedure were
		(Good > 2 years)	* Varus $\leq 0^{\circ}$	debridement	different, and
		following index	* Normal = $1 - 7^{\circ}$	* /8/135	thus unable to
		procedure	* Valgus > /*	(58%) 2 cmpt	compare success
		Secondary		* 18/32 (56%)	nate of various
		outcome: Extent		abrasion	disease
		of nain relief		arthroplasty	management
		change in use of		* 15/18 (83%)	
		pain medications.		menisectomy	
		degree of		* 102/149	
		improvement in		(68%) menisc	
		activity level,		+ debridemt	
		patient satisfaction		* 1/4 (25%)	
				lavage only	
				"Best results"	
				said to be have	
				been obtained	

Author/Year	Study Design/Purpose	Intervention/	Demographics	Results	Comments
		oucomes		after resection of unstable meniscal tear associated with mild degenerative arthritis	
Ogilivie- Harris et al 1991	Mailed patient survey plus retrospective chart and radiograph review from January 1983 to January 1987 To identify those pre-operative factors correlating with the success (or failure) of arthroscopic surgery in pts over age 50	Type of procedure performed in each of 57 total pts: * 18 menisectomies * 9 menisectomies/one debridement * 4 menisectomies/two debridements * 11 menisectomies/two debridements including tibial defect * 8 tricompartment joint debridements * 2 loose body removals * 3 plica excisions * 2 synovectomies Primary outcome: Patient's belief that his/her knee improved following surgery Secondary outcome: Severity of degenerative change on pre-op radiographs, angulation, bilateral surgery, previous surgery, crepitus, gender, twisting injury, effusion, locking,	N = 57 pts with 64 knees returned completed questionnaires (from a total of 94 pts to whom surveys were mailed) Mean age: 62 yrs (50 - 70) Of 55 pts partially accounted for in Table 1: 34 men, 21 women Mean follow-up: 33 months (ranging from 24 - 52 months)	Percentage of pts who felt they had successful results: * 82.8% immediately after rehab * 78.1% at 6 months post- op * 73.5% at 1 year post-op * 65.5% at 2 years post-op * 50.0% at 3 years post-op Pre-operative variables which had beneficial effect on outcome (p < .05) * Minimal radiographic changes * Duration of pain < 3 months * History of twisting injury Regarding alignment & degenerative changes on pre-op	Wide variability in arthroscopic intervention Non- documented validation for subjective outcomes Small sample sizes for subgroup analysis of subjective and scored results for all variables Incomplete tables and unclear description of numerical rating system(s) and statistical analysis

Author/Year Study Interv	vention/ Demographics Results Comments
Design/Purpose Out	comes
Design/PurposeOutduration (months) litigationBaumgaertner, et al 1990Retrospective case review.Pts scop same sur case review.To determine the extent and duration of symptomatic relief offered by arthroscopic debridement and identify pts most likely to benefit from debridement.Chart rev blinded to outcome symptomatic reatment included debridement and identify pts most likely to benefit from loose bo removalResults g nine-poi (created authors) pain redi function improve overall p satisfact with no preoperat symptom function improve reoperat symptom function	comes radiographs, arthroscopic procedures were: radiographs, arthroscopic procedures were: * "Of benefit" for those pts with reasonable alignment and mild to moderate degenerative changes + ed by N=49 knees (44 pts) + varus or valgus, and advanced degenerative changes Potential confounding good, 9% fair. results, 11% good, 9% fair. Potential confounding including rheumatoid attritis. viewers Average age: 63 to Failure in 33% by Pre-op symptoms classified into re Failure in 33% t pin, locking, giving way). + th pain, locking, giving way). + ment, tomy, the and diagnosis of arthritis, symptoms classified nto re Exclusion: pre-op clinical Dx of meniscal tear or based on loose bodies, non- debridement atthroscopic ment and procedures, failed attent + arthroscopic ment and attent procedures, failed conservative its ment al level +

Author/Year	Study Design/Purpose	Intervention/ Outcomes	Demographics	Results	Comments
Timonev, et	Retrospective .	=failure.	n=111 Knees.	Mean gain in	Results degrade
al, 1990	Retrospective , case series with prospective follow-up To assess the long-term outcome of arthroscopic surgery in middle-aged and elderly pts with symptomatic OA of the knee who have not responded to conservative treatment.	Arthroscopic treatment included lavage, debridement of degenerative meniscal tears and chondral lesions, and partial synovectomy with osteophytectomy as indicated. Primary outcome: Pain was scored using the Hospital for Special Surgery Knee Rating score (HSS). Secondary outcome: subjective measure of pain	n=111 Knees, n=108 pts 33 female, 75 male Mean age: 58.1(40- 81) Mean duration of f/u: 50.6 months Inclusion: All pts over 40 with intraoperative diagnosis of OA Exclusion: inflammatory diseases (RA or infectious) or acute injury.	Mean gain in 11.4 points on the HSS scoring system, significant (decrease in pain), but results degrade over time. Subjective results: 50 "good" (relief of all or most pain, with return to full work or activities as before onset of symptoms), 20 "fair" (bothersome pain, with limited activities but an improvement over preoperative levels), 41 "poor" (recurrent pain, limited activities, or additional surgeries).	Results degrade over time. Poor outcomes in patients with longer duration of symptoms, medial compartment eburnation, grade II changes (Outerbridge) in articular space, or significant malalignment.

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
Dawes et al	Randomized	Experimental	N = 20 consecutive	Within groups:	Small sample
1987	treatment study	group: Knee	pts	*	size
		aspiration		Improvement	
	To compare	followed by	10 saline washout	(especially	Selection
	benefits of joint	washout of 2 L of	in experimental	within the	process not fully
	lavage and	normal saline	group:	control group)	described
	simple saline	perfused through	* 4 women, 6 men	in outcome	
	injection in OA	joint	* Mean: 57.7 yrs	scores before	Randomization
	of knee		(43-73)	treatment	process not
	No showes in	Control group:	* Duration of sx: 2.5 cm(5, 10)	versus 12	described
	No change in	fallowed by	5.5 yr (.5-10)	treatment	Limited
	during the study	injustion of 1000	10 colina injection	*	conoralizability
	during the study	of normal saline	in control group:	Evnerimental	to those OA
	Assessment by	of normal same	* 8 women 2 men	(washout)	natients without
	single observer	Primary [.] Walking	* Mean: 63.3 vrs	group showed	knee joint
	blinded to	pain, using 100mm	(49-83)	significant	effusion
	treatment at	VAS	* Duration of sx:	decrease in	
	baseline, 1, 4		3.9 yr (1-8)	walking pain,	
	and 12 weeks	Secondary: Night		night pain and	
		pain, walking time,		morning	
		morning stiffness,		stiffness	
		stiffness, knee		* Control	
		flexion &		group showed	
		circumference,		significant	
		quadriceps bulk,		decrease in	
		sleep disturbance		walking pain,	
				night pain and	
				nioning stiffnass as	
				summess, as	
				decreased	
				walking time	
				and increased	
				knee flexion	
				Between	
				groups	
				Initial	
				difference at 1	
				wk, but by 4	
				wks no	
				significant	
				difference in	
				pain on	
				waiking	

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
Eastwood 1985	Design/Purpose Review of cases of one surgeon To identify the number and nature of failures in a relatively new procedure	Outcomes Intervention: Arthroscopic partial menisectomy (APM) Outcomes: Number of pts rated as cured, failures or lost to follow-up "Failure": Defined as no symptomatic improvement at all or only short-term relief	N = 287 technically successful partial menisectomies (of 291 procedures consecutively attempted between Nov 1979 and Mar 1983) Overall mean age: 28 yrs (16-65) 8 pts with severe osteoarthritis (mean age= 49 yrs) Inclusion: Clinical diagnosis of meniscal damage with mechanical symptoms attributable to torn meniscus Exclusion: Unsuccessful arthrosopic menisectomy requiring arthrotomy (4 pts)	Overallfindings (287APM pts)* 227 (79%)cured* 37 (13%)failures* 23 (8%) lostto follow-upFindings forthose APM ptswith bothmeniscaldamage andsevereosteoarthritis(8 of 287 pts)* 100% ptswith severeOA (n=8) werefailuresMain reasonsfor failure:* Inadequateinitialassessment andtreatment ofmeniscal tear* Dualpathology(e.g.,osteoarthritis)*	No controls or statistical analysis Small sample size of osteoarthritis subgroup
D 11007		D 1	N 0(1 (02	remnant	D : C
Kand 1985	Prospective case series.	Procedure conducted by one surgeon	N=96 knees (93 pts)	Subjective results: 73 pts improved by	Repair of meniscal tear will not change
	To determine the		47 Men, 37 Women	last evaluation.	the disease
	results of	Chart reviewers	Mean age 62	No statistically	process.
	partial	outcome	viean age= 62	significant	Partial
	menisectomy in	cateonie.	J Curo	correlation	menisectomy
	pts with OA	Arthroscopic	All pts had pain	between	should be
		partial	pre-op.	malalignment	reserved to a
		menisectomy for	40	and outcome.	specific patient
		aegenerative meniscal tear	40 pts had mechanical	Osteonhytes	specific
		memocar tear,	meenameat	Osicophytes	specific

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
		assessed by exam or questionnaire at 1 mo, 3 mo and 1 yr Symptoms, exam (when available) and subjective impression of the results assessed	symptoms. Malalignment (<5 or > 10 degrees valgus) in 58% Inclusion: Outerbridge grade III or IV chondromalacia. Pts may have had previous drilling or abrasion of bone, steroids. Exclusion: tibial osteotomy, popliteal cyst excision, osteophyte removal, lateral retinacular release	on pre-op radiograph had a negative correlation: only 71% improved vs 90% w/o (p<0.003) Conclusions: useful for pts with degenerative meniscal tear and no OA on radiograph or significant malalignment	indications for the procedure
McBride et al 1984	Retrospective review of four arthroscopic surgeons' records To determine: 1) whether preservation of medial meniscal rim protects joint and inhibits progression of degenerative change; 2) proper treatment for symptomatic degenerative tears; and 3) circumstances in which debridement is indicated.	PMM pts divided into two group: Group I: Non- degenerative tears Group II: Degenerative tears (Degenerative tear defined as multiple fibrillations, fissures or horizontal cleavage within meniscus at time of arthroscopy) Primary: Postoperative questionnaire and changes in functional status (with or without a follow-up clinical exam to evaluate symptoms and signs) Subjective composite results: "Excellent" = No symptoms with	 N = 43 pts with 44 knees (35 pts evaluated by clinical follow-up and 8 by questionnaire and phone) Group I: 26 pts with 27 knees Group II: 17 pts with 17 knees 35 men, 8 women Mean age: 56.5 yrs (42-72) Mean follow-up for both groups: 2.9 years (2-4.6) Inclusion criteria: Pts more than 40 years old who had arthroscopic partial medial menisectomy (PMM) between Oct 1977 and May 1979 	Subjective results (number of knees): Group I: Non- degenerative tears * 14 (52%) excellent * 12 (44%) good * 11 (4%) fair * 0 poor Group II: Degenerative tears * 2 (12%) excellent * 9 (53%) good * 3 (18%) fair * 3 (18%) fair * 3 (18%) poor Subjectively equating combined good and excellent	Likely selection bias. 18/63 lost to follow-up Unclear selection process for surgeons and reviewers Subjective outcomes and results w/o validated instruments Preoperative radiographs only available for 5/63 consecutive patients. Thus unable to determine significance of any radiographic findings, or whether any possible changes might be causally related to menisectomy

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
		activity and no limitations in sports or work- related activity "Good" = Minimal symptoms but no important "Fair" = Frequent pain or generally disabling symptoms "Poor" = Severe symptoms with pain at rest and limitation in walking	Exclusion criteria: Preoperative history of ligament injuries, more than 5 mm displacement (laxity) on mediolateral or anteroposterior stress testing, concomitant lateral menisectomy, extensive chondral shaving, or	results to mean "satisfactory results", significantly lower percent of "satisfactory results" (p < .05) in Group II (65%) versus Group I (96%)	Lacks clear statistical analysis and explanation of how study conclusions follow from results
Sprague 1981	Case series Determine if debridement and lavage is an effective alternative to maximal medical management of OA and to stave off TKR.	Arthroscopic debridement and lavage by one surgeon Debridement included: meniscal tear excision, articular tissue shaving, osteophytes trimmed. removal of loose bodies, fragments, and debris. Mean f/u 13.6 mo, pts assessed by subjective measures. Good result: pt reports improvement, equally functional or more functional than prior surgery. Fair: some improvement, less, equal or more functional than prior; no noticeable improvement but more functional than prior.	 78 knees in 72 pts with OA. 68 knees (62 pts) completed follow up. 27 female, 45 male Age: 24-78 (mean 56) 15 with previous menisectomy Failed maximal medical treatment. All with OA 81% with at least one meniscal tear 21% loose bodies 	Good: 74% (51 pts) Fair: 10% (7) Poor: 16% (11)	Subjective measures

Author/Year	Study	Intervention/	Demographics	Results	Comments
	Design/Purpose	Outcomes			
		Poor: unchanged			
		or worse or			
		needing			
		subsequent			
		surgery.			

Notes:

AIMS-2 - Arthritis Impact Measurement Scales AIMS2-WB - Arthritis Impact Measurement Scales - Walking and Bending subscale BMI – Body mass index D & L - debridement and lavage F/u – Follow-up HSS - Hospital for Special Surgery Knee Score KSPS - Knee-Specific Pain Scale PFS - Physical Functioning Scale NSAIDS – Non-steroidal anti-inflammatory drugs OA - Osteoarthritis Post-op – Postoperative Pre-op – Preoperative PT – Physical therapy Pts - Patients RCT - Randomized controlled trial ROM – Range of motion Sig. - Significant SF-36 - Ten item physical-function subscale from SF-36 SF-36-P - Medical Outcomes Study 36-item Short-Form General Health Survey Sx-Symptoms TKR: Total Knee Replacement Tx-Treatment VAS- Visual Analog Scale WOMAC- Western Ontario & Mc Master Universities Osteoarthritis Index,