

Knee arthroscopy for the treatment of degenerative changes of the knee joint



Report of the Expert Panel of the Swiss Medical Board

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Inhalt

EXECUTIVE SUMMARY	5
ZUSAMMENFASSUNG	6
RÉSUMÉ ANALYTIQUE	8
ABBREVIATIONS	10
1. BACKGROUND.....	11
2. METHODS	11
3. RESULTS OF THE APPRAISAL	12
3.1 EVIDENCE OF CLINICAL EFFECTIVENESS AND HARM.....	12
3.1.1 <i>Desirable effects</i>	<i>12</i>
3.1.2 <i>Undesirable effects</i>	<i>13</i>
3.1.3 <i>Overall quality of the evidence</i>	<i>14</i>
3.1.4 <i>Balance between desirable and undesirable effects</i>	<i>15</i>
3.2 CONSIDERATIONS ABOUT RESOURCE REQUIREMENTS	15
3.2.1 <i>Evidence</i>	<i>15</i>
3.2.2 <i>Additional considerations.....</i>	<i>16</i>
3.2.3 <i>Quality of the evidence in connection with resource requirements</i>	<i>16</i>
3.2.4 <i>Judgment.....</i>	<i>17</i>
3.3 PATIENT VALUES.....	17
3.3.1 <i>Judgment.....</i>	<i>17</i>
3.4 HEALTH EQUITY	17
3.4.1 <i>Judgment.....</i>	<i>17</i>
3.5 ACCEPTABILITY	18
3.5.1 <i>Judgment.....</i>	<i>18</i>
3.6 FEASIBILITY	18
3.6.1 <i>Judgment.....</i>	<i>18</i>
4. RECOMMENDATIONS	18
4.1 JUSTIFICATION	18
4.2 SUBGROUP CONSIDERATIONS.....	18
4.3 IMPLEMENTATION CONSIDERATIONS	18
4.4 MONITORING AND EVALUATION	19
4.5 RESEARCH PRIORITIES	19
5. REFERENCES.....	20

Executive Summary

The Federal Office of Public Health (FOPH) re-evaluates healthcare interventions reimbursed by the Swiss compulsory health insurance on a regular basis. Arthroscopy for degenerative changes of the knee was selected because of the large number of patients treated per year and the variable prevalences of arthroscopic interventions performed in different regions of Switzerland. The Swiss Medical Board (SMB) assessed the evidence of clinical effectiveness and safety of the intervention and evaluated the economic implications based on standard methods for systematic reviews and health economic analyses. The present Report was drafted based on this assessment using the Evidence to Decision (EtD) framework.

The assessment included 21 randomized, controlled trials (RCTs) in knee arthroscopy comprising > 2000 patients in total. Control interventions were conservative treatment approaches or other active comparators in 12 studies and non-active comparators (e.g. sham surgery or exercise program) in 9 studies. Critical outcomes (i.e. those having a major impact on decision-making) for desirable effects were joint pain, knee function, and global assessment. In the short term (< 6 months), arthroscopy reduced pain marginally but did not improve knee function or global assessment scores when compared to conservative treatment, while in the intermediate term (6 months to 7 years), there was no difference in any of these three outcomes. Critical outcomes for undesirable effects included adverse events (AEs) and need for secondary surgery. They were only assessed for the intermediate follow-up period, and there were no statistically significant differences between the arthroscopic and control groups.

The Expert Panel concluded that the differences between arthroscopic and control interventions in terms of desirable and undesirable effects were trivial. Taking into account the overall low quality of evidence, the balance of desirable versus undesirable effects is probably in favor of the control interventions.

The cost-utility analysis was based on four eligible economic studies of moderate quality that were adapted for Switzerland, using the healthcare payers' perspective. The results of these studies were ambiguous. Three of the studies reported that arthroscopic surgery was cost-effective, while one of them rated conservative treatment to be superior. Nevertheless, the Expert Panel concluded that cost-utility is more favorable for the control interventions than for arthroscopic interventions. The budget impact analysis was restricted to arthroscopic meniscectomy, and the total expenditure for this indication alone was estimated at about CHF 70 million per year in 2013 and 2014.

The Expert Panel concluded that the patients' assessments of the main outcomes of knee arthroscopy appeared to be fairly consistent. Furthermore, the Panel reasoned that any changes in policy regulating knee arthroscopy would have negligible impact on health equity.

Based on the available evidence and additional sources considered, the Expert Panel issues a strong recommendation against arthroscopic treatment of degenerative changes of the knee. This does not preclude that certain patients presenting with a specific clinical condition might benefit from this intervention. The current rule to conditionally reimburse knee arthroscopy in the inpatient sector should be extended to the outpatient sector. Reimbursement by the compulsory health insurance should be limited to patients with specific clinical conditions likely to benefit from the intervention. Focused prospective clinical studies may help to improve clinical guidance on how to identify such patients as well as those who have a higher risk of experiencing rare but serious AEs associated with knee arthroscopy.

Zusammenfassung

Das Bundesamt für Gesundheit (BAG) überprüft regelmässig die von der Schweizerischen obligatorischen Krankenversicherung erstatteten Gesundheitsleistungen. Die Arthroskopie bei degenerativen Veränderungen des Kniegelenks wurde wegen der grossen Zahl der pro Jahr behandelten Patienten und der variablen Prävalenzen von arthroskopischen Eingriffen in verschiedenen Regionen der Schweiz ausgewählt. Das Swiss Medical Board (SMB) bewertete die Evidenz für die klinische Wirksamkeit und Sicherheit der Intervention und evaluierte die wirtschaftlichen Auswirkungen anhand von Standardmethoden für systematische Übersichtsarbeiten und gesundheitsökonomische Analysen. Der vorliegende Bericht wurde auf der Grundlage dieser Bewertung unter Verwendung des Rahmenwerks Evidence to Decision (EtD; von der Evidenz zur Empfehlung / Entscheidung) erstellt.

Die Bewertung umfasste 21 randomisierte, kontrollierte Studien zur Kniearthroskopie mit insgesamt > 2000 Patienten. Als Kontrollinterventionen wurden konservative Behandlungsansätze oder andere aktive Komparatoren in 12 Studien eingesetzt und nicht-aktive Komparatoren (z.B. Scheinoperation oder Trainingsprogramm) in 9 Studien. Wichtige Endpunkte (d.h. solche, die einen grossen Einfluss auf die Entscheidungsfindung haben) für erwünschte Wirkungen waren Gelenkschmerzen, Kniefunktion und globale Bewertung. Kurzfristig (< 6 Monate) reduzierte die Arthroskopie die Schmerzen geringfügig, verbesserte aber weder die Kniefunktion noch die Gesamtbeurteilung im Vergleich zur konservativen Behandlung, während mittelfristig (6 Monate bis 7 Jahre) kein Unterschied bezüglich einer dieser drei Endpunkte bestand. Zu den wichtigen Endpunkten für unerwünschte Wirkungen gehörten unerwünschte Ereignisse (UE) und die Notwendigkeit einer Zweitoperation. Sie wurden nur für den mittleren Nachbeobachtungszeitraum bewertet, und es gab keine statistisch signifikanten Unterschiede zwischen der Arthroskopie-Gruppe und der Kontrollgruppe.

Der Expertenrat kam zu dem Schluss, dass die Unterschiede zwischen arthroskopischen Eingriffen und Kontrolleingriffen in Bezug auf erwünschte und unerwünschte Wirkungen unerheblich sind. Unter Berücksichtigung der insgesamt geringen Qualität der Evidenz dürfte die Bilanz zwischen erwünschten und unerwünschten Wirkungen wahrscheinlich zugunsten der Kontrollinterventionen sein.

Die Kosten-Nutzen-Analyse basierte auf vier geeigneten ökonomischen Studien von mittlerer Qualität, die für die Schweiz angepasst wurden und die Sicht der Gesundheitskostenträger einnahmen. Die Ergebnisse dieser Studien waren nicht eindeutig. Drei der Studien berichteten, dass arthroskopische Operationen kostenwirksam waren, während eine von ihnen die konservative Behandlung als überlegen einstufte. Dennoch kam der Expertenrat zu dem Schluss, dass das Kosten-Nutzen-Verhältnis bei den Kontrollinterventionen günstiger ist als bei arthroskopischen Interventionen. Die Budget-Impact-Analyse beschränkte sich auf die arthroskopische Meniskektomie und allein die Gesamtausgaben für diese Indikation wurden 2013 und 2014 auf rund 70 Millionen Franken pro Jahr geschätzt.

Der Expertenrat kam zu dem Schluss, dass die Einschätzungen der Patienten bezüglich der wichtigsten Endpunkte der Kniearthroskopie ziemlich einheitlich zu sein schienen. Darüber hinaus war der Rat der Auffassung, dass Änderungen in der Regulierung der Kniearthroskopie nur einen geringfügigen Einfluss auf die gesundheitsbezogene Chancengleichheit haben würden.

Basierend auf den vorliegenden Erkenntnissen und zusätzlich berücksichtigten Quellen spricht der Expertenrat eine nachdrückliche Empfehlung gegen die arthroskopische Behandlung von degenerativen Veränderungen des Kniegelenks aus. Dies schließt jedoch nicht aus, dass bestimmte Patienten mit einem spezifischen klinischen Erscheinungsbild von diesem Eingriff profitieren könnten. Die derzeitige Regelung zur bedingten Erstattung der Kniearthroskopie im stationären Bereich sollte auf den ambulanten Bereich ausgedehnt werden. Die Erstattung durch die obligatorische Krankenversicherung sollte auf Patienten mit einem spezifischen klinischen Erscheinungsbild beschränkt sein, die von der Intervention wahrscheinlich profitieren werden. Fokussierte prospektive klinische Studien können dazu beitragen, die klinischen Empfehlungen zu verbessern, um diese Patienten zu erkennen, ebenso wie diejenigen, die ein höheres Risiko haben, seltene, aber schwerwiegende UE im Zusammenhang mit der Kniearthroskopie zu erleiden.

Résumé analytique

L'Office fédéral de la santé publique (OFSP) réévalue régulièrement les interventions médicales remboursées par l'assurance obligatoire des soins suisse. L'arthroscopie pour l'altération dégénérative du genou a été retenue en raison du nombre élevé de patients traités chaque année et des prévalences variables des interventions arthroscopiques réalisées dans différentes régions de Suisse. Le Swiss Medical Board (SMB) a évalué les preuves de l'efficacité et de la sécurité cliniques de l'intervention et les implications économiques en s'appuyant sur des méthodes standard de revues systématiques et d'analyses économiques de la santé. Le présent rapport a été rédigé sur la base de cette évaluation à l'aide du cadre « *Evidence to Decision* » (EtD, des données probantes à la recommandation / décision).

L'évaluation comprenait 21 essais contrôlés randomisés (ECR) sur l'arthroscopie du genou portant, au total, sur plus de 2 000 patients. Les interventions de contrôle ont consisté en approches de traitement conservateur ou d'autres comparateurs actifs dans 12 études et des comparateurs non actifs (chirurgie placebo ou programme d'exercices) dans 9 études. Les critères de jugement critiques (c'est-à-dire ceux qui ont un impact majeur sur la prise de décisions) concernant les effets désirés ont porté sur la douleur articulaire, la fonction du genou et l'évaluation globale. Sur le court terme (< 6 mois), l'arthroscopie a réduit légèrement la douleur, mais n'a pas amélioré la fonction du genou ni les résultats de l'évaluation globale si on la compare au traitement conservateur, tandis que sur le moyen terme (de 6 mois à 7 ans), aucune différence n'a été constatée pour ces trois critères. Les critères de jugement critiques concernant les effets indésirables ont porté sur les événements indésirables (EI) et la nécessité d'une deuxième chirurgie. Ils n'ont été évalués que pour la période de suivi à moyen terme, et aucune différence statistiquement significative n'a été observée entre le groupe arthroscopique et le groupe témoin.

Le panel d'experts a conclu que les différences entre les interventions arthroscopiques et les interventions témoins en termes d'effets désirés et indésirables étaient insignifiantes. Compte tenu de la faible qualité générale des preuves, la balance entre effets désirés et effets indésirables pencherait plutôt vers les interventions témoins.

L'analyse coût-utilité reposait sur quatre études économiques éligibles de qualité moyenne, qui ont été adaptées à la Suisse en se plaçant dans la perspective du payeur des soins. Les résultats de ces études ont été ambigus. Trois des études ont indiqué que la chirurgie arthroscopique était coût-efficace, tandis que l'une d'entre elles notait le traitement conservateur comme étant supérieur. Le panel d'experts a néanmoins conclu que le rapport coût-utilité est plus favorable pour les interventions témoins que pour les interventions arthroscopiques. L'analyse de l'impact budgétaire a été limitée à la ménissectomie arthroscopique, et les dépenses totales liées à cette seule indication ont été estimées à environ 70 millions CHF par an en 2013 et 2014.

Le panel d'experts a conclu que les évaluations des patients des principaux critères de jugement de l'arthroscopie du genou sont apparues comme étant assez homogènes. Le panel a en outre déduit que tout changement de politique de réglementation de l'arthroscopie du genou aurait un impact négligeable sur l'équité en matière de santé.

S'appuyant sur les preuves disponibles et d'autres sources examinées, le panel d'experts recommande fortement de ne pas recourir au traitement arthroscopique des altérations dégénératives du genou. Cela n'exclut pas que certains patients présentant un état clinique particulier puissent bénéficier de cette intervention. La règle actuelle prévoyant de rembourser, sous

certaines conditions, l'arthroscopie du genou pour les patients hospitalisés devrait être étendue aux patients suivis en ambulatoire. Le remboursement par l'assurance obligatoire des soins doit être limité aux patients présentant des états cliniques particuliers qui ont de fortes chances de bénéficier de cette intervention. Des études cliniques prospectives ciblées pourraient aider à améliorer les conseils cliniques sur la façon d'identifier ces patients ainsi que ceux présentant un risque plus élevé de subir des EI rares mais graves associés à l'arthroscopie du genou.

Abbreviations

AE(s)	Adverse event(s)
CHOP	Schweizerische Operationsklassifikation (Swiss classification of surgical interventions)
CI	Confidence interval
DRG	Diagnosis-related group
EtD	Evidence to Decision
FOPH	Federal Office of Public Health
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HTA	Health technology assessment
ICD-10	International Classification of Diseases 10
ICER	Incremental cost-effectiveness ratio
IQWiG	Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen
MD	Mean difference
PICO	Population, intervention, control, outcome
QALY	Quality-adjusted life years
RCT	Randomized controlled trial
RR	Relative risk
SMB	Swiss Medical Board
SMD	Standardized mean difference (no unit; <0.2 is considered a small effect)

1. Background

The Federal Office of Public Health (FOPH) re-evaluates healthcare interventions that are reimbursed by the compulsory health insurance on a regular basis. In 2015, the FOPH selected arthroscopy of the knee for re-evaluation, based on a report of the Swiss Health Observatory (Obsan) indicating a 20% increase in the frequency of this intervention between 2005 and 2011.[1] A recent overview of about 30 different surgical interventions indicated that the frequency of knee arthroscopy varies considerably between Swiss cantons.[2] For example, the incidence rate of arthroscopic meniscectomy in each of the Cantons of Genève and Vaud was below 184 per 100,000 persons, whereas in the Cantons of St. Gallen, Schwyz, and Appenzell Innerrhoden it was above 452 per 100,000 persons in 2015.

In 2014, about 25,000 patients with a diagnosis of knee or meniscus derangement or meniscus tear were hospitalized.[3] It was suggested that Swiss hospitals had strong financial incentives to perform knee arthroscopy as an in-hospital service.[4] In fact, about two thirds of Swiss patients undergoing arthroscopic partial meniscectomy or debridement and lavage were admitted to hospital. Since 2019, inpatient knee arthroscopy has been reimbursed only if specific conditions preclude outpatient treatment.[5] The large number of patients per year with an indication for knee arthroscopy, coupled with the variable frequencies of arthroscopic interventions depending on the patient's location in Switzerland, necessitated a formal health technology assessment (HTA) to facilitate future changes in reimbursement policies.

2. Methods

Prioritization and scoping of the topic were done by the FOPH prior to commissioning the assessment to the SMB. Evidence of clinical effectiveness and safety as well as economic evidence were assessed in accordance with the methods described in detail in the Assessment Report. Briefly, a systematic review of randomized and quasi-randomized trials addressed two PICO (population, intervention comparison, outcome) questions: (1) knee arthroscopy versus control interventions including placebo, no treatment, conservative treatment, or any other surgical treatment, and (2) knee arthroscopy in the inpatient versus outpatient setting. This systematic review was based on a report of the German HTA agency Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (IQWiG) published in 2014.[6] It adopted the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework. Outcomes were categorized as critical (having a major impact on decision-making and considered for assessment), important (also considered for assessment) and less important (not considered for assessment) according to GRADE. The literature search included studies published up to July 2017. Finally, a systematic review of relevant economic evidence was conducted. Cost-effectiveness estimates were adapted to Swiss conditions (after evaluating their transferability), and a budget impact analysis was performed. The latter was restricted to knee arthroscopy for meniscal changes.

The Expert Panel discussed the final Assessment Report on occasion of two meetings held in March and May 2019. The appraisal was restricted to the first PICO question. For the second PICO question a single study was found in the literature. The quality of this study was judged to be very low, and thus, no formal assessment was performed.

The Evidence to Decision (EtD) framework was used.[7] Recommendations were formulated based on the available evidence and additional considerations. The EtD framework considers several

domains including the balance between desirable and undesirable effects, quality of the evidence, cost-utility / resource requirements, patient values, health equity, and acceptability / feasibility of the intervention. Differences in desirable and undesirable effects are categorized as large, moderate, small, or trivial. The recommendations are formulated as 'strong' or 'conditional' in favor of a given intervention, in favor of either the intervention or the comparator, or against the intervention. Recommendations are complemented by considerations regarding subgroups, implementation aspects, monitoring and evaluation, and research priorities.

3. Results of the appraisal

3.1 Evidence of clinical effectiveness and harm

3.1.1 Desirable effects

Evidence

The assessment included 21 randomized, controlled trials (RCTs) in knee arthroscopy involving more than 2000 patients in total. Control interventions were conservative treatments or other active comparators in 12 studies and non-active comparators (e.g. sham surgery or exercise program) in 9 studies. Outcome data were grouped in short-term (up to 6 months), intermediate-term (6 months to 7 years), and long-term (more than 7 years) follow-up intervals. However, none of the studies reported outcome data for desirable effects from long-term follow-up.

3.1.1.1 Short-term follow-up (up to 6 months)

Critical outcomes

Knee pain at short-term follow-up was assessed in 1443 patients (13 RCTs). Compared with other interventions, patients undergoing arthroscopy reported statistically significant less pain (standardized mean difference [SMD] -0.16, 95%CI -0.31 to -0.01); the quality of evidence was low. Nine RCTs comprising 1172 patients found no statistically significant effect on knee function (SMD -0.08, 95%CI -0.26 to 0.09); the quality of evidence was very low. Nine RCTs including 717 patients found no statistically significant difference in the global assessment scores after arthroscopy compared with control interventions (SMD 0.03, 95%CI -0.12 to 0.17); the quality of evidence was low.

Important outcomes

In three RCTs comprising 389 patients, arthroscopy had no beneficial effect on joint stiffness (SMD -0.09, 95%CI -0.45 to 0.27) when compared with the control interventions; the quality of evidence was very low. Two RCTs involving 282 patients concluded that arthroscopy did not improve health-related quality of life (SMD 0.18, 95%CI -0.05 to 0.42); the quality of evidence was very low. With regard to disease-specific quality of life, there was no difference between arthroscopy and control interventions in three RCTs involving 375 patients (SMD 0.18, 95%CI -0.02 to 0.39); the quality of evidence was very low.

3.1.1.2 Intermediate follow-up (latest assessment 6 months to 7 years after arthroscopy)

Critical outcomes

Ten RCTs including 1274 patients assessed knee pain at the intermediate follow-up assessment. Arthroscopy did not statistically significantly reduce pain (SMD -0.11, 95%CI -0.22 to 0.00); the quality of evidence was low. Eight RCTs involving 1024 patients assessed knee function but found no statistically significant effect in favor of arthroscopy (SMD -0.06, 95%CI -0.18 to 0.07); the quality of evidence was low. In eight RCTs comprising 735 patients, there was no statistically significant difference in global assessment scores after arthroscopy versus control interventions (SMD 0.04, 95%CI -0.16 to 0.23); the quality of evidence was low.

Important outcomes

Two RCTs including 258 patients found no statistically significant effect in favor of arthroscopy on joint stiffness (SMD -0.18, 95%CI -0.75 to 0.39); the quality of evidence was very low. Two RCTs comprising 383 patients indicated a higher relative risk (RR) for total knee replacement in the arthroscopy group, but this estimate was not statistically significant (RR 1.25, 95%CI 0.38 to 4.19); the quality of evidence was very low. There was no statistically significant effect on health-related quality of life in favor of arthroscopy compared with control interventions (SMD 0.17, 95%CI -0.02 to 0.36); the quality of evidence was moderate. In addition, in four RCTs including 525 patients, there was no statistically significant effect on disease-specific quality of life in favor of arthroscopy (SMD 0.17, 95%CI -0.02 to 0.36); the quality of evidence was moderate.

3.1.1.3 Additional considerations

It remains unclear why follow-up intervals of up to 7 years were considered as “intermediate” in the assessment. Assessment at a time point earlier than after 7 years might have been more meaningful.

3.1.1.4 Judgment

The Expert Panel concluded that the differences in desirable effects between arthroscopic and control interventions were trivial.

3.1.2 Undesirable effects

3.1.2.1 Intermediate follow-up (latest assessment 6 months to 7 years after arthroscopy)

Undesirable effects were analyzed for the intermediate follow-up interval only.

Evidence

Three RCTs involving 336 patients reported on adverse events (AEs) including need for surgery at a second stage; there was no statistically significant difference in their occurrence between the groups undergoing arthroscopic or control interventions (RR 0.41, 95%CI 0.08 to 2.17); the quality of evidence was very low. Four RCTs involving 787 patients reported on the occurrence of AEs without including secondary surgery. There was no statistically significant difference (RR 1.07, 95%CI 0.67 to 1.70) and the quality of evidence was low. Six RCTs in 586 patients found that the relative risk of secondary surgery after arthroscopic interventions versus control interventions was 0.24 (95%CI 0.14 to 0.44); the quality of evidence was low. Four RCTs in 757 patients reported some *serious* AEs; there

was no statistically significant difference in the frequency of *serious* AEs between the two groups (RR 1.83, 95%CI 0.39 to 8.62); the quality of evidence was very low.

3.1.2.2 Additional considerations

The German IQWiG report issued in 2014 did not draw any conclusions regarding harm because of insufficient data.[6] A subsequent systematic review summarized the reported data on undesirable effects of two RCTs.[8] Another more recent systematic review included non-randomized studies in addition to RCTs to assess harm. Heterogeneity was large and the assessment period was limited to three months, despite inclusion of non-randomized studies.[9]

The Assessment Report indicated a lack of evidence of harm, thus concluding that arthroscopy is a low-risk procedure. In the meantime, this has been addressed by another analysis which found that there was a 0.32% risk of serious complications including pulmonary embolism, myocardial infarction, stroke, fasciotomy, neurovascular injury, infection requiring surgery, or death within 90 days after arthroscopy.[10] The risk may be higher for older patients and those with more comorbidities. In addition, any discomfort caused by the intervention has to be considered, including pain and recovery time.

3.1.2.3 Judgment

The Expert Panel concluded that the differences in undesirable effects between arthroscopic and control interventions were small.

3.1.3 Overall quality of the evidence

For the short-term follow-up interval (up to 6 months), the overall quality of evidence was judged to be very low because of the very low quality of evidence for the critical outcome of knee function.

For the intermediate follow-up interval (latest assessment between 6 months and 7 years), the overall quality of evidence was judged to be low because of the low quality of evidence for the critical outcomes of pain, knee function, and global assessment.

No long-term follow-up data were available.

3.1.3.1 Additional considerations

A detailed discussion of limitations of the RCTs included in the assessment can be found in the Assessment Report (p. 153-156). In particular, rates of patients switching from the control group to the arthroscopy group were high (35% in one RCT). However, only 11 studies reported such rates. If switching to arthroscopy was frequent, the size of treatment effects for certain outcomes, in particular for the intermediate-term or long-term follow-up assessments, may have been underestimated in the intention-to-treat (ITT) analysis.

3.1.3.2 Judgment

The overall quality of the evidence was judged to be low.

3.1.4 Balance between desirable and undesirable effects

There is no evidence that knee arthroscopy provides any benefits in the short or intermediate term, with the exception of reduced pain noted at the short-term follow-up assessment. Long-term follow-up data were not available. Reporting on harm was scarce, and no conclusion can be drawn regarding the benefit-harm relationship. The overall quality of evidence at the short- and intermediate-term follow-up assessments was judged to be very low and low, respectively.

There is no evidence that the subgroup of patients with isolated degenerative changes of the meniscus of the knee benefits from arthroscopic treatment.

3.1.4.1 Additional considerations

The Assessment Report refers to 16 reviews (both narrative and systematic reviews with meta-analyses) published from 2012 onwards, and two HTA reports. The IQWiG report of 2014 assessed the effect of arthroscopy exclusively in patients with osteoarthritis.[6] The systematic reviews by Khan et al. published in 2014 and van de Graaf et al. published in 2016 focused on patients with degenerative meniscus lesions.[8][11] Brignardello-Petersen et al. (2017) focused on patients with osteoarthritis or degenerative meniscus lesions.[9]

The Assessment Report also included two other RCTs conducted in patients with osteoarthritis that had not been discussed in the IQWiG report. With respect to degenerative meniscus lesions, no RCTs other than those reviewed by Khan et al. and van de Graaf et al. were found in the literature. For the indication of degenerative osteoarthritic knee disease, nine RCTs in addition to those reviewed by Brignardello-Petersen et al. were included in the Assessment Report.

3.1.4.2 Judgment

The Expert Panel concluded that the balance of desirable and undesirable effects is probably in favor of the control treatment options rather than arthroscopy.

3.2 Considerations about resource requirements

3.2.1 Evidence

The assessment included a cost-utility analysis based on incremental cost-effectiveness ratio (ICER) estimates of four eligible economic studies adapted to Switzerland. In one study employing both the healthcare payer and societal perspectives, knee arthroscopy coupled with non-operative treatment was no more clinically effective than non-operative treatment alone and was more expensive.[12] In a second study conducted from the healthcare payer's perspective, immediate and delayed arthroscopic partial meniscectomy was associated with additional costs per quality-adjusted life year (QALY) of CHF 27,258 and CHF 12,925, respectively, when compared to physical therapy.[13] From a societal perspective, the additional costs per QALY for immediate arthroscopic partial meniscectomy amounted to CHF 1298, whereas delayed arthroscopic partial meniscectomy was superior to physical therapy. Two additional studies conducted from a healthcare payer's perspective reported costs per QALY associated with knee arthroscopy of CHF 7249 and CHF 7365, respectively.[14][15]

The budget impact analysis was restricted to arthroscopic meniscectomy and associated minor arthroscopic interventions for degenerative changes of the knee joint. Consequently, costs due to

traumatic knee injuries and osteoarthritis of the knee were deliberately excluded, and the population in this analysis differed from that included in the analysis of clinical effectiveness. Two analytical strategies were used for the budget impact analysis, leading to slightly different estimates:

Firstly, based on diagnosis-related group (DRG) codes, the estimate for total expenditure for “knee/meniscus derangement” ranged from CHF 53.52 million to CHF 71.93 million in 2013 and from CHF 52.30 million to CHF 67.73 million in 2014. Outpatient costs accounted for 20% to 28% of the total costs.

Secondly, based on the codes of the International Classification of Diseases 10 (ICD-10) and of the Swiss classification of surgical interventions (CHOP), the estimated annual total inpatient costs for the years 2010 to 2014 ranged from CHF 54.47 million (in 2014) to CHF 58.44 million (in 2012). The estimated annual total outpatient costs were CHF 14.73 million in 2013 and CHF 13.26 million in 2014.

The total expenditure for arthroscopic meniscectomy alone was thus estimated at CHF 71.93 million in 2013 and CHF 67.73 million in 2014.

3.2.2 Additional considerations

In a recently published observational study investigating the use of arthroscopic meniscal surgery in degenerative knee disease in Switzerland using administrative claims data of a major Swiss health insurance company, the authors reported that the incidence of arthroscopic partial meniscectomy, debridement, and lavage in patients over the age of 40 years was 388 per 100,000 person-years in 2012 and 352 per 100,000 person-years in 2015.[4]

The results of the present budget impact analysis are in line with those reported in a recent publication of the Swiss Health Observatory.[16] Assuming approximately 14,000 meniscectomies per year and inpatient costs of CHF 4889 per patient, the Swiss Health Observatory estimated total inpatient costs of CHF 55.6 million in 2016. In the present analysis, the assumed unit costs were lower (CHF 3700), whereas the estimated number of arthroscopic knee surgeries per year was higher (ranging from 15,000 to 16,000).

3.2.3 Quality of the evidence in connection with resource requirements

The quality of the four economic studies included in the assessment of cost effectiveness ranged from good [12][13] to poor [14][15]. Since all studies provided at least sufficient information on costs and effectiveness, and since the information concerning cost-effectiveness of knee arthroscopy was found to be very scarce, the results from the four studies were utilized after adapting them for Switzerland.

The study by Losina et al. (2015)[13] was based on the MeTeOR trial as the main clinical data source. [17] The description of the methods used and assumptions made was insufficient and problematic in parts. The validity of this economic analysis was rated as uncertain in the assessment. In this health-economic analysis, knee arthroscopy was clinically superior and cost-saving. However, an analysis by Marsh et al. (2016) arrived at the opposite conclusion.[12]

Only 2 of the 21 RCTs included in the assessment of clinical effectiveness of arthroscopy were used in the cost-effectiveness analysis. Among the remaining 19 RCTs, 4 studies addressed patients' quality

of life, but cost-effectiveness studies did not make use of these results. The variable data sources may explain the discrepancy in results of the clinical effectiveness and cost-effectiveness analyses.

3.2.4 Judgment

Taking into account the overall moderate quality of and discrepancies in the available economic evidence, definitive conclusions regarding the cost-utility of knee arthroscopic surgery in patients with degenerative changes of the knee are not possible. The Expert Panel concluded that the evidence from the four available studies was not convincing and that cost-utility probably favors the control interventions. Furthermore, the Expert Panel concluded from the budget impact analysis that the resource requirements for arthroscopic meniscectomy alone were moderate to large. If the expenditures for knee arthroscopy in osteoarthritis had to be taken into account in the budget impact analysis, the resulting estimates would clearly be deemed substantial.

3.3 Patient values

In the absence of a clear-cut benefit of arthroscopic treatment, there is little room for patient choice. Patients are unlikely to opt for an invasive procedure if clinically relevant improvements of the complaint cannot be ensured in either the short term or long term, except perhaps in specific patient subsets or individual patients who have a higher chance of benefiting from the surgical intervention. Thus, a rational decision for or against arthroscopic treatment requires sound understanding of the patient's specific clinical condition and unbiased, professional guidance by the healthcare provider.

Knowledge serving as a solid empirical basis for the development of patient decision aids, other information materials, and communication tools for physicians could be generated by means of qualitative and quantitative studies. Patients should be made aware that advising them against knee arthroscopy is in their interest since the burden associated with the surgical intervention very likely outweighs the benefit. In addition, patients need to understand the potentially serious nature of harm caused by arthroscopic interventions even though it is rare. Finally, less invasive treatment options and other alternatives, including even the potential of placebo treatment, should be fully discussed with the patient.

3.3.1 Judgment

The Expert Panel concluded that fairly consistent valuation of the merits of arthroscopy in terms of the main outcomes among patients can be assumed.

3.4 Health equity

Given that knee arthroscopy is freely available, considerations of equity or right to access are not relevant. In fact, there may be an increased risk of exposure to a surgical intervention with unproven net benefit for those living in areas where arthroscopy is highly utilized.[2] This may also apply to patients who are privately insured. Overuse of knee arthroscopy is ethically problematic and should be limited as far as possible.

3.4.1 Judgment

The Expert Panel concluded that a change in policy regarding knee arthroscopy would probably have no impact on health equity.

3.5 Acceptability

As a minimally invasive surgical technique, knee arthroscopy is regarded as an acceptable intervention of its type and nature.

3.5.1 Judgment

The Expert Panel concluded that knee arthroscopy is acceptable to key stakeholders including patients and healthcare providers. This judgment excludes any consideration of the effectiveness or safety of the intervention.

3.6 Feasibility

Knee arthroscopy is in widespread use in routine healthcare in Switzerland.

3.6.1 Judgment

The Expert Panel concluded that, from a technical and organizational point of view, knee arthroscopy is a feasible intervention.

4. Recommendations

The Expert Panel issues a strong recommendation against arthroscopy for degenerative changes of the knee joint.

4.1 Justification

Based on the available evidence of clinical effectiveness and safety, the balance of effects is probably in favor of the control interventions including conservative treatment approaches. The Expert Panel also considered additional sources, in particular the 2017 systematic review conducted by an international expert group and its subsequent recommendation.[9][18] The Expert Panel concluded that a strong recommendation against arthroscopic treatment of degenerative changes of the knee is justified, despite the rather inconclusive health-economic evidence available.

4.2 Subgroup considerations

Analysis of clinical effectiveness and safety included a subgroup analysis that provided no evidence of a benefit of arthroscopic treatment in patients with degenerative meniscal lesions only (as compared to osteoarthritis). This does not preclude that individual patients with a specific clinical condition are more likely to benefit from knee arthroscopy.

4.3 Implementation considerations

Measures to minimize arthroscopic overtreatment of degenerative changes of the knee joint are ethically required given that current evidence does not support the superiority of the intervention over nonsurgical treatments. Firstly, such measures should include balanced and regularly updated information on short-term and long-term risks and benefits for patients and healthcare providers, and the uncertain long-term outcomes should be declared. All patients eligible for knee arthroscopy should receive information in suitable formats that facilitate shared decision making.

Secondly, additional measures at the regulatory level should be considered. The current rule to conditionally reimburse knee arthroscopy in inpatients should be extended to the outpatient sector.[5] Reimbursement by the compulsory health insurance may be limited to patients with specific clinical conditions that have a high chance of benefiting from the intervention. Sufficiently detailed information to justify the claim should be provided by the physician in charge.

4.4 Monitoring and evaluation

Routine health data (e.g. claims data) should be used to continuously monitor and analyze any trends in connection with knee arthroscopy for degenerative knee changes over time and across regions, in both the inpatient and outpatient setting.

4.5 Research priorities

Focused clinical studies may help to improve clinical guidance on how to identify patients who are likely to benefit from the intervention and those who are at a higher risk of experiencing rare but serious AEs. Future research should address questions of de-implementation, i.e. how current over-use of knee arthroscopy can be limited. Communication with patients and the general public is of prime importance to foster health literacy. Patients' perception of knee arthroscopy and expected outcomes should be well understood to provide adequate information materials and communication aids.

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