

Kunskap och kunskapsluckor inom käkkirurgi

En systematisk granskning av
systematiska översikter

Juni 2015



SBU • Statens beredning för medicinsk utvärdering
Swedish Council on Health Technology Assessment

SBU utvärderar sjukvårdens metoder

SBU, Statens beredning för medicinsk utvärdering, är en statlig myndighet som utvärderar hälso- och sjukvårdens metoder.

SBU analyserar metodernas nytta, risker och kostnader och jämför vetenskapliga fakta med svensk vårdpraxis. Målet är att ge ett bättre beslutsunderlag för alla som avgör hur vården ska utformas.

SBU ger ut flera rapportserier. I ”SBU Utvärderar” har SBU:s expertgrupper själva gjort den systematiska utvärderingen. Serien omfattar både etablerade metoder (gula rapporter) och nya metoder (Alert). ”SBU Kommenterar” sammanfattar och kommenterar utländska medicinska kunskapsöversikter. SBU svarar också på frågor direkt från beslutsfattare i vården via SBU:s Upplysningstjänst.

Välkommen att läsa mer om SBU:s rapporter och verksamhet på www.sbu.se.

Denna utvärdering publicerades år 2015. Resultat som bygger på ett starkt vetenskapligt underlag fortsätter vanligen att gälla under en lång tid framåt. Andra resultat kan ha hunnit bli inaktuella. Det gäller främst områden där det vetenskapliga underlaget är otillräckligt eller begränsat.

Denna rapport (nr 239) kan beställas från Strömberg distribution
Telefon: 08-779 96 85 • Fax: 08-779 96 10 • E-post: sbu@strd.se

Grafisk produktion av Anna Edling, SBU
Tryckt av Elanders Sverige AB, Mölnlycke, 2015
Rapportnr: 239 • ISBN 978-91-85413-83-6 • ISSN 1400-1403

Citera denna rapport: SBU. Kunskap och kunskapsluckor inom käkkirurgi – en systematisk granskning av systematiska översikter. Stockholm: Statens beredning för medicinsk utvärdering (SBU); 2015. SBU-rapport nr 239. ISBN 978-91-85413-83-6.

Kunskap och kunskapsluckor inom käkkirurgi

En systematisk granskning av
systematiska översikter

Projektgrupp

Sakkunniga

Anders Holmlund

Bodil Lund

Bo Sunzel

Svante Twetman

SBU

Marie Österberg

(projektledare)

Sofia Tranæus

(bitr projektledare)

Laura Lintamo

(utredare)

Externa granskare

Börje Svensson

Cecilia Larsson Wexell

SBU • Statens beredning för medicinsk utvärdering

Swedish Council on Health Technology Assessment

Innehåll

Sammanfattning	7
1. Inledning	9
2. Metodbeskrivning	11
Litteratursökning	12
Urvalskriterier	12
Avgränsningar	13
Metodik för urval av systematiska översikter	13
Metodik för bedömning av studiernas vetenskapliga kvalitet	14
Metod för sammanvägning av resultat	15
3. Resultat	17
Kirurgiskt avlägsnande av tänder	17
Antibiotika- eller kortikosteroidprofylax	18
Orofaciala infektioner av odontogent ursprung	19
Tand- och käktrauma	19
Ortognatkirurgi (kirurgisk korrigerig av käkställningsfel)	19
Rekonstruktiv käkkirurgi	20
Benigna tumörer i käkarna och omgivande mjukvävnad	20
Cystor i käkarna och dess omgivande mjukvävnad	20
Premaligna orala slemhinneförändringar	21
Orala manifestationer till följd av behandling av maligna tumörer	21
Hyperbar syrgasbehandling i samband med käkkirurgi	21
Käklebskirurgi	21

4. Etik	23
5. Diskussion	25
Etiska överväganden kring den systematiska kartläggningen	27
6. Figurer och tabeller	29
7. Personer som medverkat till rapporten	69
Projektgrupp	69
Externa granskare	70
Bindningar och jäv	70
8. Referenser	71

Sammanfattning

Denna rapport har kartlagt samt sammanställt systematiska översikter inom 12 prioriterade domäner inom käkkirurgi*. Vidare har rådande kunskap och kunskapsluckor påvisats och sammanställts. Rapporten visar att det finns kunskap om farmakologisk smärtlindring, benbevarande tekniker samt benförlust efter tandextraktion, blödningsprofylax, komplikationer vid implantatinstallation i överkäken (med och utan sinuslift), samt medicinsk bedömning av patient med stor blödningsrisk vid operativ tandextraktion.

Det finns evidens för effekt av artrocentes vid diskrelaterade käkledstillstånd samt att intermaxillär fixation med käkbensförankrade skruvar vid käkfrakturer inte orsakar rotskador på närliggande tänder. Det finns också evidens för att om god information om ingreppet ges till patienter innan operationen, leder detta till ökad kunskap samt minskad ångest hos patienterna. Sammantaget ses dock ett bristande vetenskapligt underlag inom alla viktiga domäner, något som även gäller vanliga och ofta förekommande behandlingar. Denna kartläggning visar att det finns ett stort behov av forskning inom detta område för att säkerställa evidensläget. Detta sammanställda material utgör således ett underlag för forskare samt forskningsfinansiärer.

* Specialiteten heter i Sverige oral kirurgi. Internationellt skiljer man dock på oral surgery (endast dentoalveolär kirurgi) och oral and maxillofacial surgery (käckkirurgi, dvs även frakturkirurgi, käkledskirurgi och ortognatkirurgi).

1. Inledning

Det är viktigt att identifiera kunskapsluckor för olika ämnesområden med syftet att uppmuntra professionen att initiera behandlingsforskning. I det längre perspektivet är förhoppningen att det leder till att man undviker att hälso- och sjukvårdsresurser läggs på ineffektiva behandlingar. SBU fick år 2010 ett regeringsuppdrag att identifiera dessa kunskapsluckor i hälso- och sjukvården, inklusive tandvården [1].

Den brittiska databasen över kunskapsluckor, UK DUETs (Database of Uncertainties about the Effects of Treatments) och SBU har definierat en kunskapslucka som befintlig om systematiska översikter pekar på oklarhet kring en behandlingseffekt eller om systematiska översikter saknas (<http://www.library.nhs.uk/duets/>), (<http://www.sbu.se/sv/Publicerat/Vetenskapliga-kunskapsluckor/>). Det är av största vikt att en systematisk översikt avser en tydligt formulerad fråga och använder relevanta studier av hög kvalitet för att samla in och analysera uppgifter från dessa. Om så sker, kan den systematiska översikten inte bara svara på frågan och identifiera potentiell evidens utan också kommunicera vetenskapliga oklarheter och kunskapsluckor – och därigenom uppmuntra till behandlingsforskning.

Käkkirurgi är en odontologisk specialitet som omfattar diagnostik och behandling av sjukdomar och defekter i munhåla, käkar och angränsande vävnader. Cirka 60 procent av behandlingarna utförs polikliniskt. Typiska ingrepp är visdomstandkirurgi och implantatkirurgi. Resterande 40 procent kräver sjukhusresurser och många gånger inläggning av patienten. Käkkirurgiska ingrepp som kräver sjukhusresurser omfattar käkfrakturer, infektioner, käkledssjukdomar, kirurgisk korrigerande av käkställningsfel samt rekonstruktiv kirurgi för käkbensdefekter, missbildningar och benigna tumörer. Socialstyrelsen publicerade 2011 nationella riktlinjer för tandvården där rekommendationer för olika behandlingar presenterades. I riktlinjerna rangordnas behandlingarna på en skala mellan 1 och 10. En låg siffra innebär att åtgärden är ange-

lägen och bör prioriteras [2]. Även om nationella riktlinjer bidrar till att identifiera bristande kunskap så står det klart att det inte är tillräckligt. Problematiskt är också att området käkkirurgi endast till liten del omfattades av de nationella riktlinjerna. Ett flertal systematiska översikter har dock publicerats under de senaste 20 åren inom ämnesområdet käkkirurgi. Den metodologiska kvaliteten av dessa översikter har ännu inte utvärderats.

Syftet med denna rapport är att med AMSTAR [3] som bedömningsinstrument genomföra en systematisk kartläggning av befintliga systematiska översikter inom området käkkirurgi. Målet med kartläggningen är att presentera existerande kunskap samt att identifiera kunskapsluckor inom ämnesområdet.

2. Metodbeskrivning

En systematisk kartläggning innebär att man identifierar, samlar in, kvalitetsbedömer och därefter väger samman resultat från flera olika systematiska översikter. I detta avsnitt beskrivs tillvägagångssättet för hur resultaten i den systematiska kartläggningen har tagits fram.

De mest prioriterade domänerna inom ämnesområdet käkkirurgi identifierades av projektets fyra sakkunniga samt genom en förfrågan som skickades ut till de käkkirurgiska klinikerna i: Göteborg, Halmstad, Jönköping, Lund, Stockholm, Umeå, Uppsala och Örebro. Klinikerna fick ge förslag på de fem mest prioriterade domänerna. De prioriteringar som gjorts av klinikerna stämde överlag väl överens med de prioriteringar som gjorts av de sakkunniga. Domänerna rangordnades sedan med hjälp av ett antal kriterier som SBU arbetar efter:

- stor betydelse för liv och hälsa
- vanligt hälsoproblem – berör många
- stor variation i praxis
- ofullständig kunskap om hur starkt det vetenskapliga underlaget är
- stora ekonomiska konsekvenser
- viktig etisk fråga
- stor betydelse för organisation eller personal
- kontroversiell eller uppmärksammas fråga

Ju fler kriterier som uppfylls, desto mer angelägen är frågan.

Projektets experter enades om att prioritera följande domäner inom ämnesområdet käkkirurgi:

- Kirurgiskt avlägsnande av tänder
- Antibiotika- eller kortikosteroidprofylax
- Orofaciala infektioner av odontogent ursprung
- Tand- och käktrauma
- Ortognatkirurgi (kirurgisk korrigerande av käkställningsfel)

- Rekonstruktiv käkkirurgi
- Benigna tumörer i käkarna och omgivande mjukvävnad
- Cystor i käkarna och omgivande mjukvävnad
- Premaligna orala slemhinneförändringar
- Orala manifestationer till följd av behandling av maligna tumörer
- Hyperbar syrgasbehandling i samband med käkkirurgi
- Käkledskirurgi
- Etik

Litteratursökning

Litteratursökningen gjordes fram till september 2014 i fyra databaser: PubMed, The Cochrane Library, Centre for Reviews and Dissemination (CRD) och EBSCO Dentistry & Oral Science Source. Ingen begränsning gjordes vad gäller publikationernas språk. Sökstrategin var följande:

”Surgery, Oral”[Mesh] OR ”maxillofacial surgery” [tiab] OR ”craniofacial surgery” [tiab] OR ”oral surgery” [tiab] OR ”orthognathic surgery” [tiab] OR ”Oral Surgical Procedures”[Mesh] OR (”Dental Implants” [Mesh] OR ”dental implants” [tiab] OR ”oral implants” [tiab] OR temporomandibular [tiab] AND surgery [tiab]) AND systematic[sb].

Se Figur 1 för ett flödesschema över litteraturgranskningen och urvalet av studier.

Urvalskriterier

De systematiska översikterna som litteratursökningen identifierade hade varierande relevans och tillförlitlighet. Urvalskriterierna för att inkludera systematiska översikter i kartläggningen omfattade patientpopulation, intervention, kontroll samt effektmått. Frågeställningen skulle innefatta någon/några av de ovanstående elementen för att anses vara relevant. För att en systematisk översikt slutligen skulle inkluderas i kartläggningen krävdes att följande kriterier uppfylldes:

- **Population:** Alla åldrar
- **Intervention:** Käkkirurgiska behandlingar, åtgärder för att förebygga, reducera samt behandla peri- och postoperativa komplikationer och avvikelser
- **Kontroll:** Referenstest, kontroll (jämförelse)
- **Effektmått:** Utfall av käkkirurgiska behandlingar, validitet, säkerhet, kostnadseffektivitet och etiska aspekter

Avgränsningar

Följande domäner ingick inte i denna systematiska kartläggning:

- Implantatkirurgi utan benuppbyggnad
- Kirurgisk behandling av läpp-, käk- och gomdefekter
- Kirurgisk behandling av parodontala tillstånd, inklusive periimplantit
- Kirurgisk behandling av maligna tillstånd
- Endodontisk kirurgi
- Dentoalveolär kirurgi på barn
- Behandling av benigna orala slemhinneförändringar

Metodik för urval av systematiska översikter

Med stöd av urvalskriterierna identifierades och selekterades relevanta systematiska översikter i tre steg: (1) litteratursökning, (2) urval efter bedömning av de systematiska översiktens sammanfattning (abstrakt) samt (3) urval efter att ha läst de systematiska översiktens i sin helhet.

Granskning av översiktens sammanfattningar (abstrakt) gjordes parvis av projektgruppens experter, oberoende av varandra. Urvalet av artiklar som skulle granskas i fulltext var generöst. Detta innebar att endast de artiklar som med säkerhet inte uppfyllde kriterierna exkluderades. Det räckte dessutom med att en av parets experter ansåg att en studie skulle inkluderas för att den skulle läsas i sin helhet.

Relevansbedömning av översikterna i fulltext genomfördes också parvis av projektgruppens medlemmar. Vid oenighet fördes först en diskussion inom expertparet. Ibland involverades hela projektgruppen i diskussionen. Efter att alla var överens fattades beslut om inkludering eller exkludering av studien. Endast studier som tydligt uppfyllde samtliga kriterier togs med. För flödesschema, se Figur 1.

Metodik för bedömning av studiernas vetenskapliga kvalitet

Projektgruppen bedömde de systematiska översikternas vetenskapliga kvalitet med stöd av en modifierad checklista baserad på AMSTAR [3]. Efter diskussion och i enlighet med en tidigare systematisk kartläggning inom barntandvården [4] kom projektets experter fram till att punkt 1–3 och 5–8 var de mest viktiga. Förutbestämda kriterier för låg, måttlig och hög risk av publikationsbias anges i Tabell 1. Om en fråga i Tabell 1 inte besvarats i översikten bedömdes detta som att författarna inte rapporterat detta vilket resulterade i ett nej-svar.

Kvalitetsgranskningen genomfördes av projektgruppens experter, vilka gjorde det parvis och oberoende av varandra. Om en av granskarna var medförfattare på en artikel, granskades den artikeln av två andra granskare. Oenighet löstes genom konsensusförfarande och en tredje expert rådfrågades vid behov. Generellt kontrollerades inte data i varje enskild studie som inkluderats i de systematiska översikterna. I undantagsfall där det rådde oenighet eller oklarhet angående resultaten eller slutsatserna i översikten gjordes “stickprovskontroller” av enskilda studier inkluderade i översikten. Vid uppdatering av systematiska översikter inom samma ämnesområde och av samma huvudförfattare, inkluderas endast den senast publicerade.

Metod för sammanvägning av resultat

För att kunna tydliggöra inom vilka domäner det fanns kunskap respektive kunskapsluckor sammanfattades resultaten baserade på hög kvalitet narrativt. Enligt arbetsprocessen beskriven av Whitlock och medarbetare [5] gjordes ingen sammanställning av effektstorleken för de olika interventionerna.

Kunskapsluckor identifierades enligt SBU:s kriterier för en kunskapslucka, dvs att en eller flera systematiska litteraturöversikter visar på osäker medicinsk effekt av en metod (inga/få/dåliga studier eller motsägelsefulla resultat), eller att det saknas systematiska översikter av hög kvalitet. Kunskapsluckor identifierades i befintliga översikter av låg eller måttlig risk för bias (Tabell 5). Kunskapsluckor identifierades även i översikter av hög risk för bias (Tabell 6). Expertgruppen tog även hänsyn till klinisk erfarenhet samt SBU:s kriterier för urval av domäner.

3. Resultat

Totalt identifierades 200 relevanta systematiska översikter varav 45 bedömdes ha låg eller måttlig risk för bias¹ (Tabell 2). En sammanfattning av översikterna med låg eller måttlig risk för bias återfinns i Tabell 5. Översikter med hög risk för bias (och huvudsaklig orsak till detta) samt översikter exkluderade av andra orsaker redovisas i Tabell 6. En sammanfattning av befintlig evidensbaserad kunskap återfinns i Tabell 3. Kunskapsluckorna som identifierats redovisas i Tabell 4.

De viktigaste resultaten, inklusive befintlig kunskap och kunskapsluckor från identifierade översikter med låg eller måttlig risk för bias sammanfattas i nedanstående text.

Kirurgiskt avlägsnande av tänder

Sexton systematiska litteraturöversikter sorterades in under denna domän men de berörde flera olika frågeställningar. Två av översikterna handlade om olika kirurgiska tekniker för att minimera postoperativa besvär [6,7] utan att vara konklusiva. Tre andra översikter handlade om alveolarutskottets förändring i vertikal- och horisontalled efter tandextraktion, samt hur alveolära benets dimensioner bäst ska bevaras [8–10]. Det fanns ett starkt vetenskapligt stöd för att volymförlusten var störst under de första månaderna efter extraktion, framför allt på bredden. Det fanns vetenskapligt stöd för att alveolarutskottsbevarande tekniker kan reducera benförlusten efter tandextraktion. Däremot saknas kunskap om vilken typ av extraktionsteknik eller vilket benersättningsmedel som visade bäst resultat. Ytterligare en studie undersökte effekten på alveolarutskottets volymförändring efter tandextraktion, med eller utan tillägg av benbevarande tekniker. Slutsatsen var att resorptionen av alveolarutskottet efter en tandextraktion eventuellt kunde minskas, men inte

¹ Ett resultatfel som uppstått genom procedurfel, effektbedömningsfel eller annat mänskligt fel under en undersökning

elimineras. Dessa teknikers kostnadseffektivitet, när de var indicerade och vilken av metoderna som var att föredra, kunde inte fastställas [11].

Två systematiska översikter granskade förebyggande extraktioner av besvärslösa visdomständer och en studie jämförde riskerna för nervskador vid partiell, respektive total extraktion, av visdomständer. Frågan om förebyggande extraktion kunde inte besvaras [12,13]. Det fanns svagt vetenskapligt stöd för påståendet att det blir färre nervskador om enbart tandkronan extraheras [14]. Inte heller frågan om man bör behålla eller extrahera skadade eller friska kindtänder innan planerad strålbehandling för att undvika dentala komplikationer kunde besvaras i brist på studier med låg eller måttlig risk för bias [15].

Fem översikter som berörde farmakologiska frågeställningar i samband med tandextraktioner kunde inkluderas. En översikt visade att det fanns vetenskapligt stöd för att lokal behandling med tranexamsyra kunde minska den postoperativa blödningen [16] medan effekten av behandling med autologt trombocyt koncentrat [17] och klorhexidin [18] vid postoperativa besvär var osäker. Däremot fanns det ett begränsat vetenskapligt stöd för att en kombination av smärtstillande preparat (paracetamol, ibuprofen/NSAID) gav bättre smärtlindring än preparaten var för sig [19,20]. Forskning kring preparatens sidoeffekter i samband med oralkirurgiska ingrepp saknades dock till stor del. Det fanns ett starkt vetenskapligt stöd för att patienter som behandlas med antikoagulantia bör bedömas av sin allmänläkare inför tandextraktioner vid förhöjt protrobinkomplex (P-PK >3,5) [21].

Antibiotika- eller kortikosteroidprofylax

Två systematiska översikter avsåg profylaktisk antibiotikabehandling för att minska postoperativa komplikationer vid avlägsnande av visdomständer [22] samt förebyggande av bakteriell endokardit [23]. Båda fann ett otillräckligt vetenskapligt stöd och frågeställningarna utgör därför fortsatta kunskapsluckor. Inga systematiska litteraturoversikter om kortikosteroider i käkkirurgisk praxis kunde identifieras. En systematisk översikt undersökte evidensen för antibiotikaproylax vid käkkirurgi och fann att det reducerade frekvensen av postoperativa infektioner

efter implantat-, fraktur- och ortognatkirurgi (kirurgisk korrigerande av käkställningsfel). Däremot fann man inget stöd för att förlänga antibiotikaprofylaxen utöver operationsdagen. Vidare saknades det evidens för antibiotikaprofylax vid övriga käkkirurgiska ingrepp, samt även för vilket preparat, dos eller duration som var att föredra [24].

Orofaciala infektioner av odontogent ursprung

Inga systematiska översikter med låg eller måttlig risk för bias kunde identifieras.

Tand- och käktrauma

Fyra systematiska översikter identifierades under denna domän. Två studier berörde behandlingen av underkäksfrakturer, närmare bestämt om det är skillnad i behandlingsresultat vid öppen eller slutet reponering [25], eller om tänder i frakturlinjen bör extraheras eller inte [26]. Båda fann ett otillräckligt vetenskapligt underlag och frågorna kvarstår som kunskapsluckor. En översikt med måttlig evidens konkluderade att intermaxillär fixering med IMF-skrivar inte orsakade rotskador på angränsande tänder [27]. En översikt undersökte effekten av screeningverktyg samt interventioner för att minska våld i nära relationer och därmed förebygga tand- och käkskador. Denna översikt fann inga studier under denna domän och här föreligger således en kunskapslucka [28].

Ortognatkirurgi (kirurgisk korrigerande av käkställningsfel)

Frågeställningarna i nio systematiska översikter klassificerades till domänen ortognatkirurgi [29–37]. I två stycken av dessa konstaterades kunskapsluckor rörande mjukvävnadseffekter av ortognatkirurgi [29,35]. Tre översikter sammanfattade att evidens saknas för hur hypotensionsanestesi [30,37] eller tranexamsyra [31] påverkar blodförlust under ortognatkirurgiska ingrepp. Likaså saknas kunskap om effekten av ortognatkirurgi på käkledsfunktion [33]. Frågeställningen om effekten av olika alarbasuturers inverkan på den postoperativa alarbasens bredd

kunde inte heller besvaras [32]. Huruvida lågeffektlasrar har en gynnsam inverkan på behandlingsresultatet av iatrogena nervskador kunde inte heller verifieras [34]. Slutligen konstaterades en kunskapslucka rörande vilken kirurgisk metod som är den bästa för att korrigera en progen underkäke [36].

Rekonstruktiv käkkirurgi

Totalt inkluderas fyra systematiska översikter under domänen rekonstruktiv käkkirurgi [38–41]. En studie undersökte om zygoma implantat var att föredra framför andra benuppbyggande tekniker vid gravt resorberade överkäkar. Något vetenskapligt stöd kunde inte påvisas för detta [38]. Frågeställningen om implantatöverlevnaden skiljde sig mellan implantat installerade i rekonstruerat ben, jämfört med ursprungligt ben, kunde inte heller besvaras pga begränsat vetenskapligt stöd i de inkluderade primärstudierna [39]. Vilken benuppbyggande teknik som är att föredra inför implantatinstallation kunde inte heller fastställas [40]. En systematisk översikt jämförde olika tekniker för sinuslyft men fann att vetenskapligt stöd saknades för att besvara vilken metod som var bäst [41].

Benigna tumörer i käkarna och omgivande mjukvävnad

En systematisk översikt, gällande vilken behandling av unicystiskt ameloblastom som gav den lägsta recidivtendensen inkluderades. Frågeställningen ansågs inte kunna besvaras då evidensen i de ingående studierna klassificerades som låg [42].

Cystor i käkarna och dess omgivande mjukvävnad

Inga systematiska översikter med låg eller måttlig risk för bias kunde identifieras.

Premaligna orala slemhinneförändringar

Inga systematiska översikter med låg eller måttlig risk för bias kunde identifieras.

Orala manifestationer till följd av behandling av maligna tumörer

Inga systematiska översikter med låg eller måttlig risk för bias kunde identifieras.

Hyperbar syrgasbehandling i samband med käkkirurgi

Inga systematiska översikter med låg eller måttlig risk för bias kunde identifieras.

Käkledskirurgi

Sex systematiska översikter inkluderas i domänen käkledskirurgi [43–48]. Det saknas evidens för effekten av läkemedelsbehandling, både palliativ och anti-inflammatorisk, på diskdisplacering utan återgång [43]. Frågeställningen angående vilken kirurgisk intervention som har den bästa effekten vid behandling av käkledsbesvär kunde inte heller besvaras pga otillräcklig evidens [44,45,47]. När konservativ behandling av käkledsbesvär jämfördes med lavage av käkleden konkluderades att det senare hade en något bättre effekt på smärtreduktion [46]. Effekten av injektioner med botulinumtoxin för behandling av massetermuskelhypertrofi visade också utgöra en kunskapslucka [48].

4. Etik

Två systematiska översikter som berörde etiska frågeställningar kunde identifieras. Den ena fann stark evidens för att olika metoder som ökar patienters kunskap och inflytande i samband med oralkirurgiska ingrepp leder till bl a ökad tillfredställelse samt minskad ångest hos patienten [49]. Den andra fann ett begränsat stöd för metoder som kan minska risken för att kirurgiska ingrepp görs på fel sida i munhålan [50].

5. Diskussion

Denna kartläggning av systematiska översikter inom käkkirurgi visar på omfattande kunskapsluckor inom flertalet domäner inom ämnesområdet. Även många rutinmässiga kirurgiska behandlingar i käkkirurgisk praxis uppvisar ett bristande vetenskapligt underlag. Särskilt noterbart är total avsaknad av systematiska översikter med låg eller måttlig risk för bias inom områdena cystor, premaligna orala slemhinneförändringar, oro-faciala infektioner med dentalt ursprung (i denna domän hittades inte heller översikter med hög risk för bias), hyperbar syrgasbehandling i samband med käkkirurgi och orala manifestationer till följd av behandling av maligna tumörer.

Det är dock viktigt att notera att det faktum att det saknas vetenskapligt stöd inte är detsamma som att metoden inte har effekt. Det innebär enbart att det finns en osäkerhet om metodens effekt och att mer forskning behövs för att kunna säkerställa denna. Innan denna forskning har gjorts är man istället hänvisad till beprövad erfarenhet [51]. Ett exempel är förebyggande kirurgiskt avlägsnande av retinerade visdomständer fria från patologi som inte bör tas bort rutinmässigt.

Det finns även exempel på områden med stark evidens, som exempel att preoperativ patientinformation ökar patientens delaktighet i, och kunskap om, det planerade ingreppet.

Syftet med projektet har varit att identifiera kunskapsluckor inom käkkirurgi. Däremot har ingen prioritering enligt angelägenhetsgrad gjorts mellan de olika kunskapsluckorna för framtida forskning. Ett kommande projekt skulle kunna innefatta en sådan rangordning genom att använda en prioriteringsmetod framtagen av brittiska James Lind Alliance (http://www.lindalliance.org/JLA_Method.asp) där kunskapsluckor prioriteras i samarbete mellan professionen och brukarrepresentanter.

Systematiska översikter är ett mycket viktigt bidrag till den vetenskapliga litteraturen då de erbjuder en möjlighet för kliniker och forskare att på ett komprimerat sätt ta del av evidensläget inom ett visst område. På senare år har antalet publicerade systematiska översikter ökat kraftigt och denna trend är spådd att fortsätta [52,53]. Samtidigt utgör en systematisk översikt behäftad med metodfel en risk för spridning av felaktig kunskap genom att ge intrycket av statistiskt understödd och solid vetenskaplig evidens för ett visst påstående. Det är därför av största vikt att systematiska översikter, på samma sätt som primärstudier, utsätts för oberoende granskning enligt kvalitetssäkrade metoder [54,55]. Ett validerat, pålitligt och allt oftare rekommenderat instrument för granskning av systematiska översikter är AMSTAR [3]. En av de vanligaste bristerna i de översikterna som granskats i denna kartläggning är att slutsatserna baseras på primärstudier som antingen inte kvalitetsgranskats eller som har en konstaterad låg vetenskaplig kvalitet. En annan vanlig brist är att de ingående primärstudierna inte granskats av två oberoende experter.

Kunskapsluckorna i denna komplexa översikt baseras på granskning av befintlig översiktslitteratur. Ambitionen har inte varit att fritt formulera alla tänkbara frågor som är obeforskade inom käkkirurgi. Vi identifierade flera så kallade "tomma" systematiska översikter där inga primärstudier kunde inkluderas, detta pga avsaknad av studier eller att studierna höll bristande kvalitet [13,15,28,38,48]. Det finns inget enkelt sätt att bedöma dessa arbeten och det har därför föreslagits att de ska tas bort [5]. I denna sammanställning valde vi dock att behålla dem eftersom de så tydligt redovisar en kunskapslucka inom relevanta områden.

Beslutet att exkludera implantatbehandling, som inte involverar benuppbyggnad, baserades på att området är mycket omfattande, och därför behöver granskas separat. För en sådan översyn behövs dessutom kliniker med andra specialiteter inkluderas i gruppen av experter, utöver de specialister i käkkirurgi som deltog i denna projektgrupp.

Etiska överväganden kring den systematiska kartläggningen

Ur ett etiskt perspektiv är en kunskapslucka problematisk på två olika sätt. Om en åtgärd används för vilken det saknas tillräcklig evidens, kan det utsätta patienten för onödiga risker i relation till den nytta som åtgärden eventuellt kan resultera i. Å andra sidan finns det en risk att patienter undanhålls potentiellt värdefulla behandlingar om åtgärder där det saknas evidens inte används. Det faktum att det föreligger allvarliga brister i det vetenskapliga underlaget för diagnostik och behandling, inom de flesta områden inom käkkirurgi, betyder dock inte att det inte finns någon grund för att välja en viss metod framför en annan i klinisk praxis. Metoder som potentiellt kan utsätta patienter för stora risker bör till exempel undvikas. Vidare är diagnos och behandling baserad på relevanta etablerade teoretiska antaganden att föredra, jämfört med metoder som saknar sådan teoretisk grund. I brist på vetenskaplig evidens för alternativa metoder bör man också hålla sig till etablerade behandlingar [56]. Om man använder sig av alternativa metoder bör detta göras inom ramen för en klinisk prövning eller genom systematisk utvärdering.

För vissa tillstånd kan etiska svårigheter föreligga som gör det svårt att genomföra studier, något som innebär att behandlingen måste baseras på den beprövade erfarenhet som finns. Exempel på detta är åtgärder som syftar till att minska risken för osteoradionekros, vilket är ett mycket svårbehandlat tillstånd med hög morbiditet. Ett annat exempel där etisk problematik föreligger är studier av screeninginstrument och interventioner för att förhindra våld i nära relationer (och därmed också käkskador). Sådana studier kan ställas inför svåra integritetsproblem vilket också påverkar kvaliteten på data (dvs personer kanske inte svarar sanningsenligt i dessa sammanhang på grund av rädsla etc). Samtidigt får inte svårigheten att bedriva studier inom ett sådant område innebära att man inte använder sig av andra metoder för att identifiera våld i nära relationer, även om dessa naturligtvis måste användas med försiktighet.

Ett annat etiskt problem är att forskningen inom vissa domäner inom käkkirurgin till stor del är finansierad av företag. Dock skulle den domänen vara mindre beforskad utan denna företagsfinansiering. Samtidigt finns det en risk att resultatet tenderar att överskattas då det finns intressekonflikter, som t ex vid studier av benersättningsmaterial, implantat och osteosyntesmaterial. Det vore därför önskvärt om mer forskning med oberoende finansiering initierades inom dessa domäner.

Noterbart är också att hälsoekonomiska analyser av god kvalitet saknas inom samtliga undersökta domäner inom käkkirurgin. Detta är problematiskt eftersom många av de käkkirurgiska behandlingarna är kostsamma. Detta är även ett etiskt problem eftersom kostsamma metoder riskerar att leda till undanträngning av andra åtgärder. Om dessa åtgärder inte är kostnadseffektiva (dvs har en gynnsam relation mellan kostnader och effekt) så kan det vara mer motiverat att använda resurserna för alternativa åtgärder eller inom andra områden. Här är det dock viktigt att betona att enligt den svenska etiska plattformen för prioriteringar inom hälso- och sjukvård så ska åtgärdens kostnadseffektivitet balanseras mot svårighetsgraden hos det tillstånd som behandlas. Det finns också en högre acceptans för svag kostnadseffektivitet om det gäller ett svårt tillstånd.

6. Figurer och tabeller

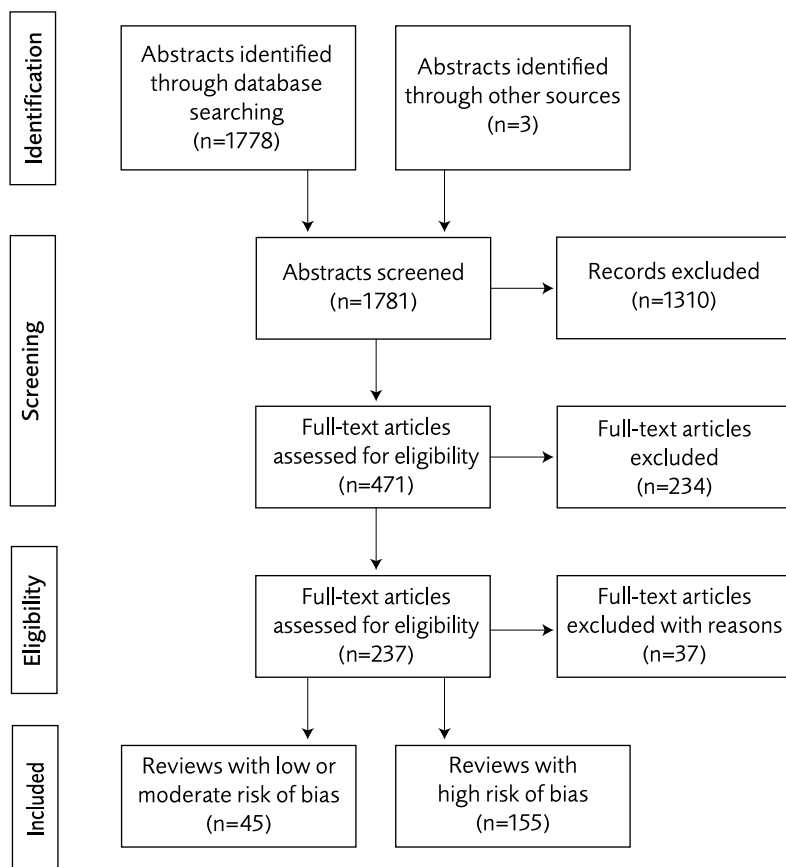


Figure 1 Flow chart.

Table 1 Pre-specified criteria of low, moderate and high risk of bias. Modified list of questions based on AMSTAR [3].

Risk of bias	Criteria
Low	<p>Predetermined research question and inclusion criteria established (AMSTAR Question 1)</p> <p>At least two independent data extractors and consensus procedure reported (AMSTAR Question 2)</p> <p>At least the database MEDLINE/PubMed used. Search strategy reported so that it can be repeated (AMSTAR Question 3)</p> <p>A list of included and excluded studies reported* (AMSTAR Question 5)</p> <p>Relevant characteristics of included studies reported (AMSTAR Question 6)</p> <p>Assessment of the overall scientific quality of each included study provided (AMSTAR Question 7)</p> <p>The scientific quality of included studies used appropriately in formulating conclusions (AMSTAR Question 8)</p> <p>The rationale for combining/not combining results reported. Methods for pooling results reported (AMSTAR Question 9)</p> <p>Likely publication bias reported. This item can be omitted if publication bias was unlikely but not reported (AMSTAR Question 10)</p> <p>Any conflict of interest reported. This item can be omitted if conflicts of interest were unlikely (AMSTAR Question 11)</p>
Moderate	A yes-answer to questions 1, 2 and 5–8
High	A no-answer to any of the question listed under moderate risk of bias

* List of included studies is mandatory; list of excluded studies can be absent.

Table 2 Number and distribution of included systematic reviews and number of reviews with low/moderate risk of bias.

Domain	Number of included reviews	Reviews with low/moderate risk of bias
Surgical removal of teeth	39	16
Antibiotic or corticosteroid prophylaxis	10	3
Orofacial infections of dental origin	0	0
Maxillofacial, mandibular and dental trauma	15	4
Orthognathic surgery	45	9
Reconstructive Oral and Maxillofacial surgery	57	4
Benign tumors of the jaws and surrounding soft tissue	4	1
Cysts of the jaws and surrounding soft tissue	4	0
Premalignant lesions of the oral mucosa	1	0
Oral manifestation due to treatment of malignant tumors	5	0
Hyperbaric oxygen therapy in conjugation with maxillofacial surgery	3	0
Temperomandibular joint surgery	15	6
Ethics	2	2
Total	200	45

Table 3 Existing evidence based knowledge according to the systematic reviews with low or moderate risk of bias.

Statement	Level of evidence (according to the review authors)
Ibuprofen is more effective than paracetamol for pain relief after lower third molar surgery	Strong
Vertical and horizontal alveolar bone loss is most rapid the first 3–6 months after tooth extraction	Strong
Clinical loss of alveolar bone width is greater than loss in height after tooth extraction	Strong
Combinations of paracetamol and NSAID (ibuprofen) are more effective for pain relief than either drug alone	Moderate
Patients with INR>3.5 should be referred to their physician for consideration of dose adjustment prior to tooth extractions	Moderate
After tooth extractions, socket preservation therapies and flapped surgery is associated with less contraction of alveolar bone	Moderate
The use of intermaxillar fixations with screws is not associated with root damages of existing teeth	Moderate
Sinus lifts are associated with a higher complication rate compared with no sinus lift after implant placement	Moderate
Lavage reduces pain slightly better than non-surgical treatment of TMJ conditions	Moderate
Information given before invasive procedures improves patients knowledge and understanding	Moderate
Antibiotic prophylaxis reduces the rate of postoperative infections in implant surgery, trauma surgery and orthognathic surgery	Low

INR = International normalized ratio; **NSAID** = Non-steroid antiinflammatory drugs;
TMJ = Temporomandibular joint

Table 4 Identified knowledge gaps.

Domain	Knowledge gaps
Surgical removal of teeth	<ul style="list-style-type: none"> • Prophylactic removal of third molars • Important variables to predict surgical difficulty/difficulties? • The best procedure for wound closure after removal of third molar surgery • The use of autologous platelet concentrate for beneficial healing after tooth extractions • The effect of adjuvant laser therapy for reducing pain, swelling and trismus after third molar surgery • The prevention of alveolar osteitis, including chlorhexidine treatment • Prophylactic removal of teeth before radiotherapy to avoid complications • Adverse effects of analgetics • Effectiveness of acupuncture for treatment of acute dental pain • Risk factors of osteonecrosis of the jaws in patients with antiresorptive treatment for non-malignant disorder • Risk of bleeding in patients treated with warfarin and other anticoagulation therapy during dental surgical procedure • Thromboembolic events after topical application of tranexamic acid • The effect of coronectomy or complete removal of mandibular third molars on nerve injuries • Long-term effects (>12 months) after tooth extraction • Soft tissue changes after tooth extraction • Type of surgical procedure most suitable for ridge preservation after tooth extraction
Antibiotic or corticosteroid prophylaxis	<ul style="list-style-type: none"> • Effect of antibiotic prophylaxis in surgical removal of teeth • The role of antibiotic prophylaxis for preventing bacterial endocarditis • The role of antibiotic prophylaxis in oral and maxillofacial surgery other than implant, fracture and orthognathic surgery • Type of preferred antibiotic compound, dose and duration of treatment • The effect of corticosteroid treatment on edema, trismus and pain after third molar removal • The effect of corticosteroid prophylaxis in oral- and maxillofacial surgery
Orofacial infections of dental origin	<ul style="list-style-type: none"> • Effect of interventions for preventing and treating orofacial infections in oral surgery

The table continues on the next page

Table 4 continued

Domain	Knowledge gaps
Maxillofacial, mandibular and dental trauma	<ul style="list-style-type: none">• Effect of early or delayed treatment of mandibular fractures• Effect of closed versus open surgical management of mandibular fractures (condylar fractures included)• Effect of different osteosynthesis materials in surgical treatment of mandibular fractures• Removal or retention of teeth in the fracture line• The effects of different interventions for management of avulsed teeth• Diagnostic value of ultrasonography• Screening tools and interventions for domestic violence
Orthognathic surgery	<ul style="list-style-type: none">• The long-term effects of anterior segmental osteotomies on soft tissue response• The effect of different alar base sutures in maintaining preoperative alar base width• Soft tissue changes after bilateral sagittal split osteotomy• The aesthetic and functional implications following clockwise or counter clockwise rotation of the occlusal plane in orthognathic surgery• Hypotensive anesthesia during bimaxillary osteotomy to reduce blood loss• The therapeutic effect of tranexamic acid on blood loss in orthognathic patients• Neurogenic complications after orthognathic surgery• Effects of low-level laser for treatment of iatrogenic nerve injuries• The effect of orthognathic surgery on TMD• The benefits of orthognathic surgery on quality of life• Relationship between malocclusion and masticatory function• Long term stability of Le Fort 1 advancement or distraction osteogenesis in cleft lip palate patients• Evaluation of vertical stability of the open bite after combined orthodontic and orthognathic surgical treatments• Skeletal stability and complication of bilateral sagittal split osteotomies (BSSO) and mandibular distraction osteogenesis (MDO) in the treatment of mandibular hypoplasia• Evaluate horizontal relapse after bilateral sagittal split advancement with different types of rigid internal fixation

The results continues on the next page

The table continues on the next page

Table 4 continued

Domain	Knowledge gaps
<i>Continued</i> Orthognathic surgery	<ul style="list-style-type: none"> • Evaluate evidence for long-term stability after surgical and non-surgical treatments of anterior open bite • Identify stability factors after double-jaw surgery of skeletal Class III malocclusion • Investigate computer programs accuracy in predicting skeletal and soft tissue changes after orthognathic surgery • Precision and accuracy of virtual planning of orthognathic procedures • Effect and complications of rapid maxillary expansion • Effect of orthognathic surgery and osteodistraction on speech and velopharyngeal status • Complications of mandibular distraction osteogenesis in congenital deformities • Evaluate evidence of corticotomy and dental distraction to shorten orthodontic treatment • Upper airway alterations after maxillomandibular advancement (MMA) • The efficacy and safety of maxillomandibular advancement in treating obstructive sleep apnea • Preferred surgical technique when treating Angle Class III malocclusion
Reconstructive Oral and Maxillofacial surgery	<ul style="list-style-type: none"> • Effect of different bone augmentation materials and tissue engineering techniques in patients with severely resorbed jaw bone; autogenous, allogenic, xenograft, barrier membranes, biological substances (bone morphogenic protein, platelet rich plasma etc) • Effect of different surgical augmentation procedures; sinus lift, vertical and horizontal augmentation, zygomatic implants and osteodistraction • Effect of immediate and delayed implant placement in reconstructed bone • Effects of bisphosphonate therapy on dental implant osseointegration • Effects of radiotherapy on dental implant outcome • Implant survival in augmented bone in comparison to prestine bone • Effect of robotic surgery in reconstructive surgery • Bone quality assessment before and after reconstruction of bone
Benign tumors of the jaws and surrounding tissue	<ul style="list-style-type: none"> • Effect of interventions for treating tumors in oral surgery • Preferred treatment of unicystic ameloblastoma
Cyst of the jaws and surrounding tissue	<ul style="list-style-type: none"> • Effect of interventions for treating cysts in oral surgery

The table continues on the next page

Table 4 continued

Domain	Knowledge gaps
Premalignant lesions of the oral mucosa	<ul style="list-style-type: none">• Effect of interventions for treating premalignant lesions in oral surgery
Oral manifestation due to treatment of malignant tumors	<ul style="list-style-type: none">• Effect of interventions for treating oral manifestation due to treatment of malignant tumors in oral surgery
Hyperbaric oxygen therapy in conjunction with maxillofacial surgery	<ul style="list-style-type: none">• Effect of hyperbaric oxygen treatment in oral surgery
Temporomandibular joint surgery (TMS)	<ul style="list-style-type: none">• Effects of palliative inflammatory medication in patients with TMJ disorders• Effect of different methods for surgical treatment of TMJ disc derangement (arthrocentesis, arthroscopic management, disc repositioning, discectomy and modified condylotomy)• Effect of different methods for surgical treatment of TMJ ankylosis (autogenous and alloplastic)• Effect of coronoidectomy and coronoidotomy in patients with enlargement of the coronoid process• Effect of different methods for surgical treatment of recurrent TMJ dislocation• Effect of different methods for surgical treatment of TMJ benign tumors• Effect of Hyaluronic acid injections in patients with temporomandibular disorders• Effect of Botulinum toxin injections in patients with masseter muscle hypertrophy• Management of patients with juvenile arthritis with TMJ involvement• Diagnostic value of bone scans in patients with condylar hyperplasia
Ethics	<ul style="list-style-type: none">• Preferred method to prevent wrong side surgery• Preferred type of intervention to improve patients knowledge

Table 5 Main objectives, results and estimated level of evidence of systematic reviews with low and medium risk of bias.

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Surgical removal of teeth				
Alexander 2014 [19]	To investigate the pain relief of nonselective NSAID and paracetamol compared with each drug alone after oral surgery	There was moderate level of evidence that a combination was better than each drug alone (5)	Not stated	Moderate
Bailey 2013 [20]	Pain relief after surgical removal of lower third molars using ibuprofen and paracetamol separately or in combination	<ul style="list-style-type: none"> a. There is high level of evidence that ibuprofen is more effective than paracetamol (6) b. There is limited level of evidence that a combination of drugs is more effective than respective drug alone (2) c. There is insufficient level of evidence on comparable side effects between the groups (7) 	Adverse effects	Moderate

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Carrasco- Labra 2012 [6]	To evaluate secondary vs primary closure for prevention of postoperative complication	Small difference; no preference for either approach. The confidence in the results is low (14)	The best procedure for closure after surgical removal of impacted mandibular third molars	Low
Da Costa 2012 [12]	Is there justi- fication for prophylactic third molar surgery?	The question could not be answered. Insufficient level of evidence (4)	Prophylactic removal of third molars	Low
Del Fabbro 2011 [17]	Is the use of autologous platelet con- centrate beneficial for healing of extraction sockets?	Favorable effects on hard and soft tissue healing and postoperative discomfort was often reported. Insufficient level of evidence (8)	The use of autologous platelet concentrate at tooth extractions	Moderate
Yengopal 2012 [18]	Efficacy of chlorhexidine for the pre- vention of alveolar osteitis and rate of adverse reactions	Insufficient evidence supporting prevention of alveolar osteitis. Chlorhexidine does not cause higher adverse reactions than placebo (10)	Efficacy of chlorhexidine for the prevention of alveolar osteitis	Low
Tan 2011 [8]	Change of alveolar ridge (hard and soft tissues) after tooth extraction	Rapid horizontal and vertical bone loss in the first 3–6 months, horizontal most substantial (20)	Soft-tissue changes after extraction	Moderate

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Van der Weijden 2009 [9]	Change in height and width of the residual ridge after tooth extraction	Strong evidence that a clinical loss in width is greater than loss in height (12)	Long-term effects (>12months)	Moderate
Coulthard 2014 [7]	To investigate benefits and risks with different surgical techniques for surgical extraction of wisdom teeth	a. There is low to moderate level of evidence that triangular flaps showed lower frequency of alveolar osteitis and pain after 24 hours compared to envelop flaps. Swelling after one week was less in envelope flap patients b. For all other outcome measures the level of evidence is insufficient (31)	Effect of different techniques for surgical removal of wisdom teeth	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Eliyas 2013 [15]	To compare the effects of maintaining the patient's natural dentition compared to extracting teeth, before radiotherapy, in areas difficult to access by the patient and the dentist	Insufficient level of evidence, no studies could be included (0)	Comparisons of keeping teeth versus prophylactic extractions before radiotherapy	Low
Ker 2013 [16]	To assess the effect of topical application of tranexamic acid on bleeding during surgery	a. There is moderate level of evidence that topical application of tranexamic acid reduces bleeding b. The risk for thromboembolic events is uncertain (29)	The effect of topical application of tranexamic acid on thromboembolic events	Low
Aframian 2007 [21]	To provide recommendations on management of patients treated with warfarin undergoing simple tooth extraction	High level of evidence that patients with INR (International Normalized Ratio) higher than 3.5 should be referred to their physician for consideration of dose adjustment (12)	Thromboembolic risk after discontinuation of warfarin	Moderate

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Long 2012 [14]	To compare coronectomy with total removal of third molars for reducing nerve injury	Less damage of the inferior alveolar nerve with coronectomy compared to total removal. The level of evidence was not stated (4)	Partial or complete removal of mandibular third molars	Moderate
Mettes 2012 [13]	To compare prophylactic removal of asymptomatic impacted wisdom teeth with conservative management	Insufficient level of evidence, no studies could be included (0)	Prophylactic removal of impacted third molars	Low
Vignoletti 2011 [10]	Efficacy of alveolar ridge preserving protocols after tooth extraction and how these techniques affect the placement of dental implants and final implant supported restoration	High to moderate level of evidence that socket preservation therapies and flapped surgery results in less contraction of alveolar bone. The most beneficial biomaterial or surgical procedure could not be determined. Long-term outcomes are lacking (14)	Type of surgical procedure or biomaterial most suitable for ridge preservation after tooth extraction	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Horváth 2013 [11]	Examine the effect of ARP compared to unassisted socket healing	Post-extraction alveolar ridge resorption might be limited but not eliminated by ridge preservation. Weak to moderate level of evidence (14)	Which material or method that is most effective for ARP. Case selection criteria for ARP. Implant survival in ARP treated sites. Cost-effectiveness of ARP. Patients' quality of life following ARP	Low
Antibiotic or corticosteroid prophylaxis				
Oomens 2012 [22]	Effect of antibiotics on the infectious complication rate after third molar surgery	Evidence for the efficacy of antibiotic prophylaxis in third molar surgery is lacking. Metronidazol has no effect (23)	Efficacy of antibiotic prophylaxis in third molar surgery	Moderate
Glenny 2013 [23]	To assess efficacy of antibiotic prophylaxis during invasive dental procedures in patients at risk for bacterial endocarditis	Evidence for effectiveness or ineffectiveness of antibiotic prophylaxis against bacterial endocarditis in risk patients is lacking (1)	The role of antibiotic prophylaxis for preventing bacterial endocarditis	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
SBU 2010 [24]	To assess which surgical procedures that benefit from antibiotic prophylaxis in terms of reduced postoperative infections and preferred compound, dose and duration of antibiotic administration	There is limited level of evidence that antibiotic prophylaxis gives a reduced number of postoperative infections in implant surgery, orthognathic surgery and open reduction and fixation of fractures There is no evidence for improved outcome for a particular compound or by prolonging the antibiotic administration beyond the day of surgery (40)	Preferred type of compound used as antibiotic prophylaxis. The value of antibiotic prophylaxis in oral and maxillofacial surgery except implant surgery, fracture surgery and orthognathic surgery	Low

Orofacial infections of dental origin

No systematic reviews with low or moderate risk of bias found

Maxillofacial, mandibular and dental trauma

Bobrowski 2013 [26]	Which is the best procedure when there is tooth involvement in mandibular angle fractures?	No difference in postoperative infections between removing or retaining the tooth, insufficient level of evidence (13)	Shall the teeth in the fracture line be removed or retained?	Moderate
---------------------------	--	--	--	----------

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Alves Jr 2012 [27]	Root damage after contact with inter- maxillary screws	No clinical changes of roots. Moderate level of evidence (6)	Clinical conse- quences of the use of intermaxillary screws	Moderate
Nasser 2013 [25] (IV)	Review effect of either open or closed management of mandibular fractures in adults (condylar) fractures excluded)	Lack of evidence for the effectiveness of a single approach in the management of mandibular fractures (12)	Open or closed management of mandibular fractures	Moderate
Coulthard 2010 [28]	Effect of interventions to reduce or prevent domestic violence	Insufficient level of evidence. No studies were included (0)	Intervention and screening tools to prevent domestic violence causing dental and/or facial trauma	Low
Orthognathic surgery				
Jayaratne 2010 [29]	To evaluate ST changes after ASO	A reduction of labial prominence with an increase in the nasolabial angle was noted, insufficient level of evidence (11)	The long-term effects of ASO on ST response	Moderate
Choi 2008 [30]	Should deliberate hypotension be routinely used during orthognathic surgery?	Hypotensive anesthesia can be a justified recommended procedure, limited level of evidence (54)	Does hypotensive anesthesia during bimaxillary oste- otomy reduce blood loss?	Moderate

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Song 2013 [31]	The efficacy of tranexamic acid on blood loss in orthognathic surgery	Tranexamic acid reduces blood loss. Level of evidence not stated (4)	The therapeutic effect of tranexamic on blood loss in orthognathic surgery	Moderate
Liu 2014 [32]	Evaluate modified alar base cinch suture in comparison with classic alar base suture after LeFort I osteotomy	Modified alar base cinch suture seems more effective in maintaining preoperative alar base width. Limited level of evidence (3)	Solid conclusions regarding effect of different alar base sutures in maintaining preoperative alar base width	Moderate
Al-Riyami 2009 [33]	Effects of orthognathic treatment on TMD	Patients with TMD appear more likely to see improvements, then deterioration, after orthognathic treatment. Limited level of evidence (53)	In which patients is orthognathic treatment beneficial on their TMD problems	Moderate
Coulthard 2014 [34]	To evaluate the effects of different interventions to treat iatrogenic injury of the inferior alveolar or lingual nerves	Low-level laser treatment showed a greater increase in sensation compared to placebo. Very low level of evidence (2)	Effects of low-level laser for treatment of iatrogenic nerve injuries	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Joss 2010 [35]	To evaluate the hard/soft tissue ratio after bilateral sagittal split advancement osteotomy	Evidence based conclusion on soft tissue changes are unknown (12)	Soft tissue changes after bilateral sagittal split osteotomy	Low
Minami- Sugaya 2012 [36]	To evaluate different surgical treatments (BSSO or IVRO) of Angle Class III mal-occlusions in adults	There is no evidence that any of the included surgical treatments is superior to the other (2)	Preferred surgical treatment of Angle Class III malocclusions	Moderate
Paul 2007 [37]	To evaluate the effect of deliberate hypotension on blood loss in orthopedic and orthogn- athic surgery	Deliberate hypo- tension reduces blood loss during orthopedic and orthognathic surgery. The smallest benefit was seen in orthognathic surgery. Limited level of evidence (17)	The role of hypotension in orthognathic surgery	Moderate
Reconstructive Oral and Maxillofacial surgery				
Esposito 2013 [38]	Dental implants in zygomatic bone for the rehabilitation of deficient edentulous maxilla	Insufficient level of evidence, no studies identified (0)	Do zygomatic implants offer advantages over alternative bone augmentation techniques?	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Donos 2008 [39]	Compare outcome of implants in lateral bone augmented sites	Similar implant survival in augmented sites compared to pristine bone. Limited level of evidence (4)	Implant survival in bone augmented areas compared to pristine bone	Moderate
Esposito 2009 [40]	To test the necessity of augmentation techniques and compare effectiveness of horizontal versus vertical augmentation	Unclear which of the bone augmentation techniques that are most effective (13)	Most effective bone augmentation technique for dental implant treatment	Moderate
Esposito 2014 [41]	a. To assess the beneficial or harmful effects of maxillary sinus lifts with or without bone augmentation b. To compare different sinus lift techniques for dental implant rehabilitation	a. Sinus lift versus no sinus lift: Complication rate was higher for sinus lift, moderate level of evidence (4) b. No difference in effect when comparing different techniques, low level of evidence (14)	Effect of bone augmentation procedures (sinus lift) in maxillary sinus compared to no bone augmentation The preferred sinus lift technique	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Benign tumors of the jaws and surrounding soft tissue				
Lau 2006 [42]	Assessment of which treatment of unicystic ameloblastoma that yields the lowest recurrence rate	Resection resulted in the lowest recurrence rate, followed by enucleation with Carnoy's solution. Enucleation resulted in highest recurrence rates. Marsupialization cannot be evaluated, weak level of evidence (6)	Which treatment of unicystic ameloblastoma that results in the lowest recurrence rate	Moderate
Cysts of the jaws and surrounding soft tissue				
<i>No systematic reviews with low or moderate risk of bias found</i>				
Premalignant lesions of the oral mucosa				
<i>No systematic reviews with low or moderate risk of bias found</i>				
Oral manifestation due to treatment of malignant tumors				
<i>No systematic reviews with low or moderate risk of bias found</i>				
Hyperbaric oxygen therapy in conjunction with maxillofacial surgery				
<i>No systematic reviews with low or moderate risk of bias found</i>				

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Temporomandibular joint surgery				
Januzzi 2012 [43]	Evaluate combined palliative and anti-inflammatory medication for treatment of TMJ disc displacement without reduction	Efficacy and safety of self-care combined with anti-inflammatory drugs in the treatment of TMJ, insufficient level of evidence (2)	The use of palliative and anti-inflammatory medication for treatment of TMJ disc displacement without reduction	Moderate
Guo 2009 [44]	Is arthrocentesis and lavage better than arthroscopy to treat TMD?	No answer could be provided (2)	The use of arthrocentesis and lavage in the management of TMD	Low
Rigon 2011 [45]	The effect of arthroscopy compared to open surgery, arthrocentesis and non-surgical treatment on TMD	Open surgery more effective for pain reduction after 12 months. Arthroscopy increases interincisal opening compared to arthrocentesis. Arthroscopy and non-surgical treatments reduced pain after 6 months. Low level of evidence (7)	Effect of arthroscopy compared to open surgery	Moderate

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Vos 2013 [46]	To compare effect of temporo- mandibular lavage to non-surgical treatment on pain and mandibular range of movement	Lavage slightly better effect on pain reduction. No difference between the two treatments regarding range of motion. Moderate level of evidence (3)	Health economy evaluations and patient satisfaction	Low
Al-Baghdadi 2014 [47]	To investigate the effects of different temporoman- dibular joint (TMJ) surgical interventions	There is insufficient level of evidence to determine preferred intervention (20)	Effectiveness of different TMJ surgical interventions	Low
Fedorowicz 2013 [48]	To assess the efficacy and safety of botulinum toxin treatment of benign bilateral masseter hypertrophy	Insufficient level of evidence. No studies included (0)	Efficacy of botul- inum toxin for the treatment of masseter hyper- trophy	Low

The table continues on the next page

Table 5 continued

First author Year Reference	Objectives	Main results and the estimated level of evidence according to authors (number of studies)	Knowledge gaps	Level of risk of bias for system- atic review assessed by SBU according to Table 1
Ethics				
Kinnersley 2013 [49]	Assess effects on patients, clinicians and the health care system of interventions to promote informed consent from patients undergoing invasive procedures	There is strong level of evidence that the interventions used consistently improve patient knowledge (65)	Preferred type of intervention for improving patients' knowledge	Low
Mahar 2012 [50]	Evaluation of procedures and interventions for reducing WSS	The incidence of wrong site extractions decreased after the intervention program, low level of evidence (1)	The effect of interventions on WSS	Moderate

ARP = Alveolar ridge preservation; **ASO** = Anterior segmental osteotomies; **BSSO** = Bilateral sagittal split osteotomies; **INR** = International normalized ratio; **IVRO** = Intraoral vertical ramus osteotomy; **NSAID** = Non-steroid antiinflammatory drugs; **ST** = Soft tissue; **TMD** = Temporomandibular joint disorders; **TMJ** = Temporomandibular joint; **WSS** = Wrong site surgery

Table 6.1 Excluded systematic reviews due to high risk of bias.

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Akadiri 2009 [59]	To identify important variables determining surgical difficulty	2, 5, 7
Brigardello-Petersen 2012 [60]	Efficacy of adjuvant laser therapy for reduction of pain, swelling and trismus after third molar surgery	8
Weil 2007 [61]	Assessment of the effectiveness/harmful effects of paracetamol compared to placebo for pain relief after third molar surgery	8
Barona-Dorado 2014 [62]	Scientific evidence of platelet rich plasma to post-extraction retained lower third molar alveoli	2, 5, 7
Suska 2010 [63]	Removal of impacted third molars, effect, complications	7, 8
Patatanian 2006 [64]	Indication for treating, patients undergoing dental extractions and receiving oral anticoagulation therapy, with hemostatic mouthwash instead of interrupting oral anticoagulation treatment	2, 7
Pichler 2001 [65]	Prevention of nerve injury during third molar surgery using lingual flaps/retractors	2
Leung 2012 [66]	Available treatment modalities and their outcomes of neurosensory deficit after third molar surgery	7, 8
Markiewicz 2008v [67]	Measure the effect of corticosteroids on edema, trismus and pain after third molar removal	7, 8
Moore 1997 [68]	Assess the analgesia obtained from single oral dose of paracetamol or paracetamol in combination with codeine	2, 6, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Steel 2012 [69]	Identify differences in postoperative outcomes between the surgical and lingual split techniques in the removal of third molars	2
Liu 2013 [70]	To analyze adverse drug reactions associated with local anesthetics	5, 7, 8
Nemantullah 2009 [71]	To evaluate the bleeding risk of patients treated with warfarin during dental surgical procedures	8, 9
Brauer 2009 [72]	To remind practitioners of unusual complications associated with third molar surgery	2, 5, 6, 7, 8
Vittorini Orgeas 2013 [73]	Efficacy of different methods to maintain residual bone after extraction	2, 8
Barden [74] 2004	To compare the relative efficacy of analgesics after third molar extractions	5, 6, 7, 8
Sultan 2009 [75]	Single oral dose of flurbiprofen for acute postoperative pain in adults	8
Tirunagari 2009 [76]	Single oral dose of etodolac for acute postoperative pain in adults	8
Hedström 2007 [77]	Prevention of alveolar osteitis	2, 6, 8
Ernst 1998 [78]	Is acupuncture effective in treating acute dental pain?	2, 8
Hess 2008 [79]	Identifying risk factors for osteonecrosis of the jaws in patients on bisphosphonates for non-malignant disorder	2, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Krueger 2007 [80]	To assess the risk of bisphosphonate associated osteonecrosis of the jaw	2, 6, 7, 8
Song 2000 [81]	Cost-effectiveness of prophylactic removal of third molars	8
Dan 2010 [82]	Effect of administration of corticosteroids (CS) in oral surgery	1, 2, 7, 8
Lodi 2012 [83]	To determine the effect of antibiotic prophylaxis on of infectious complications following dental extractions	8
Herrera-Briones 2013 [84]	Effects of corticosteroids in third molar surgery	7, 8
Kyzas 2011 [85]	Is prophylactic antibiotics effective when treating mandibular fractures	7, 9, 10, 11
Rahimi 2012 [86]	The effect of nucleoside antiviral medication on recurrent herpes labialis	8, 10, 11
Tan 2011 [87]	Does prophylactic antibiotics reduce postoperative infection after orthognathic surgery	8
Oomens 2014 [88]	To provide evidence based recommendations of different antibiotic regimens for preventing postoperative infections after orthognathic surgery	6, 8
Andreasen 2008 [89]	Effect of open versus closed repositioning of mandibular fractures	2, 5, 6, 7, 8
Adeyemo 2011 [90]	Diagnostic accuracy of ultrasonography in maxillofacial fractures	2, 5, 6, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Andreasen 2006 [91]	Is there evidence for prophylactic use of antibiotics in relation to maxillofacial fractures?	2, 7, 8
Hermund 2008 [92]	Effect of early or delayed treatment upon healing of mandibular fractures	1, 2, 8
Nussbaum 2008 [93]	Determine whether open or closed reduction of condylar fractures produces the best results	2, 7, 8
Abdel-Galil 2010 [94]	To investigate the current evidence for nonsurgical and surgical management of fractures of the mandibular condyle	2, 5, 6, 8
Al-Moraissi 2014 [95]	To compare the effect of three-dimensional miniplates with standard ones for fixation of mandibular angle fractures	8
Day 2010 [96]	To compare the effects of a range of interventions for managing traumatized permanent teeth with avulsion injuries	8
Hinckfuss [97] 2008	Periodontal healing after replantation of avulsed permanent teeth with or without systemic antibiotic prescription	2, 7, 8
Hinckfuss 2009 [98]	Examine the evidence of splinting duration and periodontal healing for replanted avulsed teeth	2, 7, 8
Colella 2007 [99]	Neurogenic complications after orthognathic surgery, subjective versus objective measurements	5, 7, 8
Saltaji [100] 2012	Long-term skeletal stability after maxillary distraction osteogenesis in cleft lip and palate patients	7, 8
Saltaji 2012 [101]	Evaluate the long-term skeletal stability after maxillary surgical Le Fort I advancement in patients with cleft lip palate	7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Hsieh 2012 [102]	Effect of mandibular advancement on obstructive sleep apnea	5, 6, 7
Kamashta-Ledezma 2014 [103]	Cinch sutures and/or VY closures to prevent maxillary incisor exposure in orthognathic surgery	5, 6, 7
Hunt 2001 [104]	Are there psychosocial benefits of orthognathic surgery?	2, 7, 8
De Gijt 2012 [105]	Effectiveness of mandibular midline distraction (MMD)	1, 2, 6, 8
Joss 2010 [106]	The effect of different fixation methods was studied on soft tissue changes and compared after bilateral sagittal split osteotomies	8, 9, 11
Lindenmayer 2010 [107]	The effect of maxillofacial procedures on temporomandibular joint dysfunctions (orthognathic surgery, third molar surgery)	8, 10, 11
Pirklbauer 2011 [108]	Effect of maxillomandibular advancement on obstructive sleep apnea syndrome	2
Solano-Hernandez 2014 [109]	To evaluate vertical stability of the open bite after combined orthodontic and orthognathic surgical treatment	8, 9, 10, 11
Lagravère 2006 [110]	Evaluate skeletal and dental changes after surgically assisted rapid maxillary expansion	8
Mensik 2014 [111]	Evaluate postoperative hypoesthesia after different splitting techniques in bilateral sagittal split osteotomy	2, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Ow 2009 [112]	Skeletal stability and complication of bilateral sagittal split osteotomies (BSSO) and mandibular distraction osteogenesis (MDO) in the treatment of mandibular hypoplasia	7, 8
Pineiro-Aguilar 2011 [113]	Review data regarding intraoperative blood loss during orthognathic surgery	2, 7, 8
Sonego 2014 [114]	The aesthetic and functional implications following clockwise or counter clockwise rotation of the occlusal plane in orthognathic surgery	8
Magalhaes 2010 [115]	Relationship between mal-occlusion and masticatory function	8, 9
Joss 2009 [116]	Evaluate horizontal relapse after bilateral sagittal split advancement with different types of rigid internal fixation	2, 8
Kaipatur 2009a [117]	Investigate computer programs accuracy in predicting skeletal changes after orthognathic surgery	7, 8
Kaipatur 2009b [118]	Investigate computer programs accuracy in predicting soft tissue changes after orthognathic surgery	7, 8
Antonarakis 2012 [119]	To evaluate nerve damage after bilateral sagittal split osteotomy	8
Plooj 2010 [120]	Summarize 3D imaging for orthognathic surgery	2, 6, 7, 8
Soh 2013 [121]	Is orthognathic surgery beneficial on quality of life?	2, 6, 7, 8
Verstraaten 2009 [122]	Is surgically assisted rapid maxillary expansion safe and useful?	8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Paes 2013 [123]	Mandibular distraction osteogenesis in infants suffering Robin sequence	8
Alanko 2010 [124]	To investigate the psychosocial wellbeing of surgical-orthodontic patients	2, 6, 7, 8
Caples 2010 [125]	To investigate upper airway alterations after maxillomandibular advancement (MMA)	8
Chanchareonsook 2006 [126]	To investigate the effect of cranio-maxillofacial osteotomies and distraction osteogenesis on speech and velopharyngeal status	2, 5, 6, 7, 8
Stokbro 2014 [127]	Precision and accuracy of virtual planning of orthognathic procedures	2, 8
Verlinden 2014 [128]	Complications of mandibular distraction osteogenesis for congenital deformities	2, 7, 8
Greenlee 2011 [129]	Evaluate evidence for long-term stability after surgical and non-surgical treatments of anterior open bite	8
Hassan 2007 [130]	To assess the effect of orthognathic surgery on speech in non-cleft patients	2, 7, 8
Holty 2010 [131]	Estimate the efficacy and safety of maxillomandibular advancement in treating obstructive sleep apnea	2, 3, 5, 7, 8
Khanna 2012 [132]	Evidence of strategies for life-threatening facial hemorrhage	2, 3, 5, 6, 7, 8
Hoogveen 2014 [133]	Evaluate evidence for corticotomy and dental distraction to shorten orthodontic treatment duration in adolescent and adult patients	8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Mucedero 2008 [134]	Identify stability factors after double-jaw surgery of skeletal Class III malocclusion	8
Gunarajah 2013 [135]	To review materials for reconstruction of post-traumatic orbital floor defects	7, 8
Al-Daghreer 2008 [136]	To investigate long-term skeletal stability after craniofacial distraction osteogenesis	6, 7, 8
Araújo 2013 [137]	To investigate the effectiveness of block allograft for reconstruction of alveolar bone	2, 7, 8
Mangano 2013 [138]	To evaluate the effectiveness of mesenchymal stem cells in maxillary sinus augmentation	6, 7, 8
Oliver Klein 2011 [139]	Reliability of maxillary sinus floor elevation and ridge augmentation with bone substitutes for dental implant success	7, 8
Plachokova 2008 [140]	Effect of platelet-rich plasma on bone regeneration	4, 8, 7
Ribeiro-Rotta 2007 [141]	Efficacy of clinical methods to assess jawbone prior to implant placement	7, 8
Ricci 2013 [142]	Rehabilitation of alveolar ridges with titanium grids	8
Weng 2011 [143]	Evaluation of socket and ridge preservation techniques	2, 3, 7, 8
Chanchareonsook 2013 [144]	Effect of bone tissue engineering for mandibular defects	6, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
De Ceulaer 2012 [145]	Identification of studies on robotic surgery in oral and maxillofacial, craniofacial and neck surgery	2, 5, 7, 8
Delli 2013 [146]	Surgical treatment of maxillary midline frenulum	5, 6, 7, 8
Herford 2011 [147]	Bone morphogenetic protein in reconstruction of mandibular defects	5, 6, 7, 8
Jacobsen 2013 [148]	To evaluate the clinical outcome of using adult mesenchymal stem cells (MSC) in oral reconstructive surgery	2, 7, 8
Pluijmers 2013 [149]	Overview of correction of the mandible in unilateral craniofacial microsomia in the growing patient	8, 9
Sadr-Eshkevari 2013 [150]	Determine the scope and limitations of alloplastic mandibular reconstruction	2, 7, 8
Saulacic 2008 [151]	Assess knowledge regarding distraction osteogenesis (DO) for vertical augmentation of atrophic alveolar ridge in terms of outcome	2, 6, 7, 8
Van Hout 2011 [152]	Determine state of the art in growth factor-aided tissue engineered reconstruction in patients with clefts of lip, alveolus and palate	2, 7, 8
De Freitas-Moreno R 2013 [153]	New bone formation and safety in maxillary sinus augmentation, recombinant bone morphogenetic protein-2 (BMP-2) versus autogenous bone only	6, 7, 8
Del Fabbro 2013 [154]	Maxillary sinus augmentation, clinical and histomorphometric outcome of autogenous platelet concentrates	5, 6, 7
Gielkens 2007 [155]	Do barrier membranes prevent bone resorption in autologous bone grafts during the healing period?	5, 6, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Jensen 2012 [156]	Maxillary sinus floor augmentation; Bio-Oss versus Bio-Oss mixed with autogenous bone	2, 5, 6, 7
Khojasteh 2013 [157]	Effects of different growth factors on bone regeneration	1, 2, 5, 6, 7, 8
Khojasteh 2013 [158]	Vertical ridge augmentation: clinical importance of recipient site characteristics	2, 5, 6, 7, 8
Rickert 2012 [159]	Maxillary sinus lift; autogenous bone and growth factors were compared with autogenous bone only	5, 7, 8
Storgård-Jensen 2009 [160]	Bone augmentation procedures in alveolar ridge defects; clinical results of different bone grafts and bone-substitute materials	2, 5, 7, 8
Chadha 2013 [161]	Evaluation of the effect of bisphosphonate (BP) therapy on dental implant osseointegration	7, 8
Madrid 2009 [162]	Can bisphosphonate (BP) therapy endanger osseointegration? What is the risk of ONJ-development after oral implant therapy	7, 8
Nooh [163] 2013	The influence of radiation therapy of dental implant survival. Furthermore the effect of radiation dose, location of implants, timing of dental implant procedure in relation to radiation therapy and the effect of HBO therapy	7, 8
Javed 2010 [164]	To assess implant survival rate after oral cancer therapy	2
Colella 2007 [165]	To compare the implant failure rate after pre- or post-radiation therapy both in relation to RT dose up to 1 year post operatively	7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Ihde 2009 [166]	Is the risk of implant failure greater in irradiated bone and is this risk dose dependent? What is the influence of the anatomical location on the survival rate	7, 8
Barber 2009 [167]	Does primary insertion of dental implants (before radiation therapy) improve the survival?	7, 8
Milinkovic 2014 [168]	Are there specific indications for different bone augmentation procedures for implant placement?	7, 8
Nkenke 2009 [169]	Autogenous bone (AB) or bone substitutes (BS) for sinus floor augmentation?	7, 8
Pjetursson 2008 [170]	Survival rate of grafts and implants placed with sinus floor augmentation techniques?	7, 8
Roffi 2013 [171]	Can the use of platelet-rich plasma (PRP) improve bone integration of graft, graft substitutes and implants?	2, 5, 7, 8
Rocchietta 2008 [172]	What is the predictability of vertical bone ridge augmentation to enable dental implants?	2, 7, 8
Tan 2008 [173]	Assess survival rate of implants placed in sites with sinus floor elevation	1, 7, 8
Clementini 2013 [174]	Evaluate success of immediate or delayed implant placement following guided bone regeneration or on lay graft augmentation	7
Clementini 2011 [175]	Assess success rate of implants placed in sites regenerated with autologous bone grafts	2, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Del Fabbro 2011 [176]	Evaluate implant survival after osteotome-mediated maxillary sinus augmentation	7, 8
Duttenhoefer 2013 [177]	Investigate influence of different treatment modalities on implant survival in grafted maxillary sinus sites	7, 8
Arora 2010 [178]	To investigate if platelet-rich plasma (PRP) with bone and bone substitutes leads to more rapid and effective bone regeneration in maxillary sinus augmentation procedures	7, 8
Calin 2014 [179]	To investigate the effect of sinus floor elevation using osteotomes	8, 9
Chan 2013 [180]	To investigate the quality of grafted bone in the socket after tooth extraction and compare with naturally healed sockets	2, 7, 8
Chrcanovic 2013 [181]	To investigate the survival and complications of zygomatic implants	7, 8
Chrcanovic 2013 [182]	To investigate the effect of different surgical techniques for zygomatic implants	2, 6, 7, 8
Waasdorp 2010 [183]	Effectiveness of allogenic onlay bone blocks to correct alveolar ridge deformities	2, 6, 7, 8
Goiato 2014 [184]	Evaluate survival of implants inserted into the zygomatic bone for maxillary rehabilitation	7, 8
Jung [185] 2008	Assess the clinical, radiographic and histological outcome of growth factors for localized ridge augmentation	7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Klijn 2010 [186]	Evaluate which approach is the best in using autologous bone grafts after sinus floor augmentation surgery	6, 7, 8
Kuchler 2014 [187]	Examine the survival and success rates of implants in horizontal ridge augmentation in the anterior maxilla	7, 8
Pogrel 2009 [188]	Determine the long-term management for ameloblastoma and the role of enucleation in the different subtypes of (solid, cystic and peripheral)	2, 6, 7, 8
Poveda-Roda 2013 [189]	To review and evaluate if clinical and radiological signs can differentiate between pseudo tumors and tumors and between malignant and benign tumors in the temporomandibular joint (TMJ)	2, 7, 8
Johnson [190] 2013	To evaluate treatment modalities and respective recurrence for keratocystic odontogenic tumor	2, 7, 8
Blanas 2000 [191]	Recurrence rate of surgical treatment of odontogenic keratocysts	5, 6, 7, 8
Kacmarzyk 2012 [192]	Recurrence rate for surgical treatment of keratocystic odontogenic tumor	6, 7, 8
Johnson 2013 [193]	To examine frequency of the most common odontogenic cysts and tumors	2, 6, 7, 8
Antonoglou 2014 [194]	To evaluate recurrences after surgical treatment of keratocystic odontogenic tumors	6, 8
Brasileiro 2014 [195]	To investigate the effect of topical management of oral hairy leukoplakia	2, 5, 6, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Nabil 2011 [196]	Identify incidence and influencing factors in the development of osteoradionecrosis (ORN) after tooth extraction in irradiated patients	2, 7, 8
Nabil 2012 [197]	Determine the risk for developing osteoradionecrosis (ORN) of the jaws among irradiated head and neck cancer patients	2, 7, 8
Pitak-Arnnop 2008 [198]	Review the management of jaw bone osteoradionecrosis	2, 6
Dijkstra 2004 [199]	Risk factors for trismus and intervention effects to treat trismus	6, 7, 8
Chrcanovic 2014 [200]	Dental implant survival, irradiated versus non-irradiated patients	6, 7, 8
Fritz 2010 [201]	Effects of pre- and post-irradiation hyperbaric oxygen therapy for prevention of osteoradionecrosis	2, 6, 7
Chambrone 2013 [202]	Does hyperbaric oxygen therapy improve the implant survival rate in radiated	8
Bennet 2012 [203]	Clinical outcome of hyperbaric oxygen therapy on irradiated patients	8
Al-Baghdadi 2014 [204]	The effects of locking duration on the success of therapeutic interventions in "closed lock"	2, 8
Guarda-Nardini 2010 [205]	Review epidemiology of synovial chondromatosis in the temporomandibular joint	1, 2, 7, 8

The table continues on the next page

Table 6.1 continued

Reviews excluded due to high risk of bias	Objectives	No answer to critical AMSTAR question according to Table 1
Katsnelson A 2012 [206]	Comparison of range of movement (ROM) after two techniques when treating ankyloses. Gap resection vs resection and reconstruction with costochondral grafts	2, 8
Limchaichana 2006 [207]	Magnetic resonance tomography (MRT) diagnostics for diagnosis/detection of temporomandibular joint (TMJ) disease	3, 8
Manfredini 2010 [208]	Hyaluronic acid in the treatment of temporomandibular disorders	3, 8
Mulder 2012 [209]	Coronoidectomy vs coronoidotomy intraoral vs extraoral	2, 3
Saridin 2011 [210]	Review relevant studies to estimate the diagnostic value of bone scans on unilateral condylar hyperplasia	2, 3
Al-Moraissi 2014 [211]	To investigate the effectiveness of arthroscopy and arthrocentesis for temporo treatment of temporomandibular joint internal derangements	2, 8
te Veldhuis 2014 [212]	Review management of children with juvenile arthritis with temporomandibular joint involvement	8

Table 6.2

Systematic reviews excluded due to relevance	Reason for exclusion
Al-Riyami S [213]	Out of topic
Guo [58]	Out of topic
Gotfredsen K [214]	Out of topic
List T [215]	Out of topic
Sharma A [216]	Out of topic
Riben C [217]	Not systematic review
Coulthard P [218]	Out of topic
Manfredini D [219]	Not systematic review
Morad [220]	Animal studies
Raijmakers [221]	Not systematic review
Sansare [222]	Not systematic review
Van Diermen [223]	Not systematic review
Wanner [224]	Out of topic
Yueh-Ling, [225]	Not systematic review
Schimmel [226]	Out of topic
Saltaji [227]	Out of topic
Schrott [228]	Out of topic
Shadid [229]	Out of topic
Shelley [230]	Out of topic
Smektala [231]	Out of topic
Su [232]	Out of topic
Tahmaseb [233]	Out of topic
Tang [234]	Out of topic
Thoma [235]	Out of topic
Tong [236]	Out of topic
Tuna [237]	Out of topic
Wermker [238]	Out of topic

The table continues on the next page

Table 6.2 continued

Systematic reviews excluded due to relevance	Reason for exclusion
Bonito [239]	Out of topic
Esposito [240]	Updated version exists
Li [241]	Out of scope
Li [242]	Out of scope
Moore [243]	Not systematic review
List [215]	Not systematic review
Martinez-Zapata [244]	Out of scope
Patton [245]	Out of scope
Liu [246]	Not systematic review
Abrahamsson [247]	More recent systematic review exists
Baccaglioni [248]	Out of topic

7. Personer som medverkat till rapporten

Projektgrupp

Sakkunniga

Anders Holmlund

Professor emeritus, Karolinska Institutet

Bodil Lund

Universitetslektor, övertandläkare, Karolinska Institutet

Bo Sunzel

Docent, övertandläkare, Skånes Universitetssjukhus, Lund

Svante Twetman

Professor, Köpenhamns Universitet

SBU

Marie Österberg

Projektledare

Sofia Tranæus

Biträdande projektledare

Laura Lintamo

Utredare

Externa granskare

SBU anlitar externa granskare av sina rapporter. Dessa har kommit med värdefulla kommentarer, som i hög grad bidragit till att förbättra rapporten. I slutversionen av rapporten har SBU dock inte kunnat tillgodose alla ändrings- eller tilläggsförslag från de externa granskarna, bl a därför att de inte alltid varit samstämmiga. De externa granskarna står därför inte nödvändigtvis bakom samtliga slutsatser eller andra texter i rapporten.

Externa granskare har varit:

Börje Svensson

Docent, Universitetssjukhuset Örebro

Cecilia Larsson Wexell

Med dr, övertandläkare, Södra Älvsborgs sjukhus

Bindningar och jäv

Sakkunniga och granskare har i enlighet med SBU:s krav inlämnat deklARATION rörande bindningar och jäv. Dessa dokument finns tillgängliga på SBU:s kansli. SBU har bedömt att de förhållanden som redovisas där är förenliga med kraven på saklighet och opartiskhet.

8. Referenser

1. Regeringsbeslut avssende Uppdrag att identifiera och aktivt föra ut kunskap om otillräckligt utvärderade metoder i hälso och sjukvården, dnr S2009/8874/HS. 2009.
2. Socialstyrelsen. Nationella riktlinjer för vuxentandvård 2011 – stöd för styrning och ledning
3. Shea BJ, Grimshaw JM, Wells GA, Boers M, Andersson N, Hamel C, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Methodol* 2007;7:10.
4. SBU. En systematisk kartläggning och granskning av systematiska översikter inom barn- och ungdomstandvården – vad vet vi egentligen? Stockholm: Statens beredning för medicinsk utvärdering (SBU); 2015. SBU-rapport nr 230.
5. Whitlock EP, Lin JS, Chou R, Shekelle P, Robinson KA. Using existing systematic reviews in complex systematic reviews. *Ann Intern Med* 2008;148:776-82.
6. Carrasco-Labra A, Brignardello-Petersen R, Yanine N, Araya I, Guyatt G. Secondary versus primary closure techniques for the prevention of post-operative complications following removal of impacted mandibular third molars: a systematic review and meta-analysis of randomized controlled trials. *J Oral Maxillofac Surg* 2012; 70:e441-57.
7. Coulthard P, Bailey E, Esposito M, Furness S, Renton TF, Worthington HV. Surgical techniques for the removal of mandibular wisdom teeth. *Cochrane Database Syst Rev* 2014;7:CD004345.
8. Tan WL, Wong TL, Wong MC, Lang NP. A systematic review of post-extraction alveolar hard and soft tissue dimensional changes in humans. *Clin Oral Implants Res* 2012;23 Suppl 5:1-21.
9. Van der Weijden F, Dell'Acqua F, Slot DE. Alveolar bone dimensional changes of post-extraction sockets in humans: a systematic review. *J Clin Periodontol* 2009;36:1048-58.
10. Vignoletti F, Matesanz P, Rodrigo D, Figuero E, Martin C, Sanz M. Surgical protocols for ridge preservation after tooth extraction. A systematic review. *Clin Oral Implants Res* 2012;23 Suppl 5:22-38.
11. Horvath A, Mardas N, Mezzomo LA, Needleman IG, Donos N. Alveolar ridge preservation. A systematic review. *Clin Oral Investig* 2013;17:341-63.
12. Costa MG, Pazzini CA, Pantuzo MC, Jorge ML, Marques LS. Is there justification for prophylactic extraction of third molars? A systematic review. *Braz Oral Res* 2013;27:183-8.
13. Mettes TD, Ghaeminia H, Nienhuijs ME, Perry J, van der Sanden WJ, Plasschaert A. Surgical removal versus retention for the management of asymptomatic impacted wisdom

- teeth. *Cochrane Database Syst Rev* 2012;6:Cd003879.
14. Long H, Zhou Y, Liao L, Pyakurel U, Wang Y, Lai W. Coronectomy vs. total removal for third molar extraction: a systematic review. *J Dent Res* 2012; 91:659-65.
 15. Eliyas S, Al-Khayatt A, Porter RW, Briggs P. Dental extractions prior to radiotherapy to the jaws for reducing post-radiotherapy dental complications. *Cochrane Database Syst Rev* 2013; 2:Cd008857.
 16. Ker K, Beecher D, Roberts I. Topical application of tranexamic acid for the reduction of bleeding. *Cochrane Database Syst Rev* 2013;7:Cd010562.
 17. Del Fabbro M, Bortolin M, Taschieri S. Is autologous platelet concentrate beneficial for post-extraction socket healing? A systematic review. *International Journal of Oral and Maxillofacial Surgery* 2011;40:891-900.
 18. Yengopal V, Mickenautsch S. Chlorhexidine for the prevention of alveolar osteitis. *Int J Oral Maxillofac Surg* 2012;41:1253-1264.
 19. Alexander L, Hall E, Eriksson L, Rohlin M. [The combination of non-selective NSAID 400 mg and paracetamol 1000 mg is more effective than each drug alone for treatment of acute pain. A systematic review]. *Swed Dent J* 2014;38:1-14.
 20. Bailey E, Worthington HV, van Wijk A, Yates JM, Coulthard P, Afzal Z. Ibuprofen and/or paracetamol (acetaminophen) for pain relief after surgical removal of lower wisdom teeth. *Cochrane Database Syst Rev* 2013;12:Cd004624.
 21. Aframian DJ, Lalla RV, Peterson DE. Management of dental patients taking common hemostasis-altering medications. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007;103:S45.e1-11.
 22. Oomens MA, Forouzanfar T. Antibiotic prophylaxis in third molar surgery: a review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2012; 114:e5-12.
 23. Glenny AM, Oliver R, Roberts GJ, Hooper L, Worthington HV. Antibiotics for the prophylaxis of bacterial endocarditis in dentistry. *Cochrane Database Syst Rev* 2013;10:Cd003813.
 24. SBU. Antibiotikaprofylax vid kirurgiska ingrepp. En systematisk litteraturöversikt. Stockholm: Statens beredning för medicinsk utvärdering (SBU); 2010. SBU-rapport nr 200. ISBN 978-91-85413-36-2.
 25. Nasser M, Pandis N, Fleming PS, Fedorowicz Z, Ellis E, Ali K. Interventions for the management of mandibular fractures. *Cochrane Database Syst Rev* 2013;7:Cd006087.
 26. Bobrowski AN, Sonogo CL, Chagas Junior OL. Postoperative infection associated with mandibular angle fracture treatment in the presence of teeth on the fracture line: a systematic review and meta-analysis. *Int J Oral Maxillofac Surg* 2013;42:1041-8.
 27. Alves M, Baratieri C, Araújo MTS, Souza MMG, Maia LC. Root damage

- associated with intermaxillary screws: a systematic review. *Int J Oral Maxillofac Surg* 2012;41:1445-50.
28. Coulthard P, Yong SL, Adamson L, Warburton A, Worthington HV, Esposito M, Sharif MO. Domestic violence screening and intervention programmes for adults with dental or facial injury. *Cochrane Database Syst Rev* 2010;12:Cd004486.
 29. Jayaratne YS, Zwahlen RA, Lo J, Cheung LK. Facial soft tissue response to anterior segmental osteotomies: a systematic review. *Int J Oral Maxillofac Surg* 2010;39:1050-8.
 30. Choi WS, Samman N. Risks and benefits of deliberate hypotension in anaesthesia: a systematic review. *Int J Oral Maxillofac Surg* 2008;37:687-703.
 31. Song G, Yang P, Hu J, Zhu S, Li Y, Wang Q. The effect of tranexamic acid on blood loss in orthognathic surgery: a meta-analysis of randomized controlled trials. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;115:595-600.
 32. Liu X, Zhu S, Hu J. Modified versus classic alar base sutures after LeFort I osteotomy: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2014;117:37-44.
 33. Al-Riyami S, Cunningham SJ, Moles DR. Orthognathic treatment and temporomandibular disorders: a systematic review. Part 2. Signs and symptoms and meta-analyses. *Am J Orthod Dentofacial Orthop* 2009;136:626.e1-16, discussion 626-7.
 34. Coulthard P, Kushnerev E, Yates JM, Walsh T, Patel N, Bailey E, et al. Interventions for iatrogenic inferior alveolar and lingual nerve injury. *Cochrane Database Syst Rev* 2014;4:Cd005293.
 35. Joss CU, Joss-Vassalli IM, Kiliaridis S, Kuijpers-Jagtman AM. Soft tissue profile changes after bilateral sagittal split osteotomy for mandibular advancement: a systematic review. *J Oral Maxillofac Surg* 2010;68:1260-9.
 36. Minami-Sugaya H, Lentini-Oliveira DA, Carvalho FR, Machado MA, Marzola C, Saconato H, et al. Treatments for adults with prominent lower front teeth. *Cochrane Database Syst Rev* 2012;5:Cd006963.
 37. Paul JE, Ling E, Lalonde C, Thabane L. Deliberate hypotension in orthopedic surgery reduces blood loss and transfusion requirements: a meta-analysis of randomized controlled trials. *Can J Anaesth* 2007;54:799-810.
 38. Esposito M, Worthington HV. Interventions for replacing missing teeth: dental implants in zygomatic bone for the rehabilitation of the severely deficient edentulous maxilla. *Cochrane Database Syst Rev* 2013;9:Cd004151.
 39. Donos N, Mardas N, Chadha V. Clinical outcomes of implants following lateral bone augmentation: systematic assessment of available options

- (barrier membranes, bone grafts, split osteotomy). *J Clin Periodontol* 2008;35:173-202.
40. Esposito M, Grusovin MG, Felice P, Karatzopoulos G, Worthington HV, Coulthard P. Interventions for replacing missing teeth: horizontal and vertical bone augmentation techniques for dental implant treatment. *Cochrane Database Syst Rev* 2009;Cd003607.
 41. Esposito M, Felice P, Worthington HV. Interventions for replacing missing teeth: augmentation procedures of the maxillary sinus. *Cochrane Database Syst Rev* 2014;5:Cd008397.
 42. Lau SL, Samman N. Recurrence related to treatment modalities of unicystic ameloblastoma: a systematic review. *Int J Oral Maxillofac Surg* 2006;35:681-90.
 43. Januzzi E, Nasri-Heir C, Grossmann E, Leite FM, Heir GM, Melnik T. Combined palliative and anti-inflammatory medications as treatment of temporomandibular joint disc displacement without reduction: a systematic review. *Cranio* 2013;31:211-25.
 44. Guo C, Shi Z, Revington P. Arthrocentesis and lavage for treating temporomandibular joint disorders. *Cochrane Database Syst Rev* 2009;Cd004973.
 45. Rigon M, Pereira LM, Bortoluzzi MC, Loguercio AD, Ramos AL, Cardoso JR. Arthroscopy for temporomandibular disorders. *Cochrane Database Syst Rev* 2011;Cd006385.
 46. Vos LM, Huddleston Slater JJ, Stegenga B. Lavage therapy versus nonsurgical therapy for the treatment of arthralgia of the temporomandibular joint: a systematic review of randomized controlled trials. *J Orofac Pain* 2013;27:171-9.
 47. Al-Baghdadi M, Durham J, Araujo-Soares V, Robalino S, Errington L, Steele J. TMJ Disc Displacement without Reduction Management: A Systematic Review. *J Dent Res* 2014;93:37s-51s.
 48. Fedorowicz Z, van Zuuren EJ, Schoones J. Botulinum toxin for masseter hypertrophy. *Cochrane Database Syst Rev* 2013;9:Cd007510.
 49. Kinnersley P, Phillips K, Savage K, Kelly MJ, Farrell E, Morgan B, Whistance R, Lewis V, Mann MK, Stephens BL, Blazeby J, Elwyn G, Edwards AGK. Interventions to promote informed consent for patients undergoing surgical and other invasive healthcare procedures. *Cochrane Database Syst Rev* 2013;7:Cd009445.
 50. Mahar P, Wasiak J, Batty L, Fowler S, Cleland H, Gruen RL. Interventions for reducing wrong-site surgery and invasive procedures. *Cochrane Database Syst Rev* 2012;9:Cd009404.
 51. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ* 1996;312:71-2.
 52. Straus S, Moher D. Registering systematic reviews. *CMAJ* 2010;182:13-4.
 53. Booth A, Clarke M, Gherzi D, Moher D, Petticrew M, Stewart L. An international registry of systematic-review protocols. *Lancet* 2011;377:108-9.

54. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4:1.
55. Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;349:g7647.
56. SBU. Rotfyllning. En systematisk litteraturöversikt. Stockholm: Statens beredning för medicinsk utvärdering (SBU); 2010. SBU-rapport nr 203. ISBN 978-91-85413-39-3.
57. Janssen NG, Weijs WL, Koole R, Rosenberg AJ, Meijer GJ. Tissue engineering strategies for alveolar cleft reconstruction: a systematic review of the literature. *Clin Oral Investig* 2014;18:219-26.
58. Guo J, Li C, Zhang Q, Wu G, Deacon SA, Chen J, et al. Secondary bone grafting for alveolar cleft in children with cleft lip or cleft lip and palate. *Cochrane Database Syst Rev* 2011:Cd008050.
59. Akadiri OA, Obiechina AE. Assessment of difficulty in third molar surgery--a systematic review. *J Oral Maxillofac Surg* 2009;67:771-4.
60. Brignardello-Petersen R, Carrasco-Labra A, Araya I, Yanine N, Beyene J, Shah PS. Is adjuvant laser therapy effective for preventing pain, swelling, and trismus after surgical removal of impacted mandibular third molars? A systematic review and meta-analysis. *Journal of Oral and Maxillofacial Surgery* 2012;70:1789-1801.
61. Weil K, Hooper L, Afzal Z, Esposito M, Worthington Helen V, van Wijk A, et al. Paracetamol for pain relief after surgical removal of lower wisdom teeth. *Cochrane Database of Systematic Reviews: Reviews* 2007;Issue 3.
62. Barona-Dorado C, Gonzalez-Regueiro I, Martin-Ares M, Arias-Irimia O, Martinez-Gonzalez JM. Efficacy of platelet-rich plasma applied to post-extraction retained lower third molar alveoli. A systematic review. *Med Oral Patol Oral Cir Bucal* 2014;19:e142-8.
63. Suska F KG, Molander A, Samuelsson O, Svanberg T, Liljegren A. Removal of impacted wisdom teeth. Gothenburg: The Regional Health Technology Assessment Centre (HTA-centrum). 2010;HTA-rapport 2010:30.
64. Patatianian E, Fugate SE. Hemostatic mouthwashes in anticoagulated patients undergoing dental extraction. *Ann Pharmacother* 2006;40:2205-10.
65. Pichler JW, Beirne OR. Lingual flap retraction and prevention of lingual nerve damage associated with third molar surgery: a systematic review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001;91:395-401.
66. Leung YY, Fung PP, Cheung LK. Treatment modalities of neurosensory deficit after lower third molar surgery: a systematic review. *J Oral Maxillofac Surg* 2012;70:768-78.
67. Markiewicz MR, Brady MF, Ding EL, Dodson TB. Corticosteroids reduce

- postoperative morbidity after third molar surgery: a systematic review and meta-analysis. *J Oral Maxillofac Surg* 2008;66:1881-94.
68. Moore A, Collins S, Carroll D, McQuay H. Paracetamol with and without codeine in acute pain: a quantitative systematic review. *Pain* 1997;70:193-201.
69. Steel B. Lingual split versus surgical bur technique in the extraction of impacted mandibular third molars: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2012;114:294-302.
70. Liu W, Yang X, Li C, Mo A. Adverse drug reactions to local anesthetics: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;115:319-327.
71. Nematullah A, Alabousi A, Blanas N, Douketis JD, Sutherland SE. Dental surgery for patients on anticoagulant therapy with warfarin: a systematic review and meta-analysis. *J Can Dent Assoc* 2009;75:41.
72. Brauer HU. Unusual complications associated with third molar surgery: A systematic review. *Quintessence Int* 2009;40:565-572.
73. Vittorini Orgeas G, Clementini M, De Risi V, de Sanctis M. Surgical techniques for alveolar socket preservation: a systematic review. *Int J Oral Maxillofac Implants* 2013;28:1049-1061.
74. Barden J, Edwards JE, McQuay HJ, Wiffen PJ, Moore RA. Relative efficacy of oral analgesics after third molar extraction. *Br Dent J* 2004;197:407-11; discussion 397.
75. Sultan A, McQuay HJ, Moore RA, Derry S. Single dose oral flurbiprofen for acute postoperative pain in adults. *Cochrane Database Syst Rev* 2009: Cd007358.
76. Tirunagari SK, Derry S, Moore RA, McQuay HJ. Single dose oral etodolac for acute postoperative pain in adults. *Cochrane Database Syst Rev* 2009: Cd007357.
77. Hedstrom L, Sjogren P. Effect estimates and methodological quality of randomized controlled trials about prevention of alveolar osteitis following tooth extraction: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007;103:8-15.
78. Ernst E, Pittler MH. The effectiveness of acupuncture in treating acute dental pain: a systematic review. *Br Dent J* 1998;184:443-447.
79. Hess LM, Jeter JM, Benham-Hutchins M, Alberts DS. Factors associated with osteonecrosis of the jaw among bisphosphonate users. *Am J Med* 2008;121:475-483.e3.
80. Krueger CD, West PM, Sargent M, Lodolce AE, Pickard AS. Bisphosphonate-induced osteonecrosis of the jaw. *Ann Pharmacother* 2007;41:276-84.

81. Song F, O'Meara S, Wilson P, Golder S, Kleijnen J. The effectiveness and cost-effectiveness of prophylactic removal of wisdom teeth. *Health Technol Assess* 2000;4:1-55.
82. Dan AE, Thygesen TH, Pinholt EM. Corticosteroid administration in oral and orthognathic surgery: a systematic review of the literature and meta-analysis. *J Oral Maxillofac Surg* 2010;68:2207-20.
83. Lodi G, Figini L, Sardella A, Carrassi A, Del Fabbro M, Furness S. Antibiotics to prevent complications following tooth extractions. *Cochrane Database Syst Rev* 2012;11:Cd003811.
84. Herrera-Briones FJ, Prados Sanchez E, Reyes Botella C, Vallecillo Capilla M. Update on the use of corticosteroids in third molar surgery: systematic review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;116:e342-51.
85. Kyzas PA. Use of antibiotics in the treatment of mandible fractures: a systematic review. *J Oral Maxillofac Surg* 2011;69:1129-45.
86. Rahimi H, Mara T, Costella J, Speechley M, Bohay R. Effectiveness of antiviral agents for the prevention of recurrent herpes labialis: a systematic review and meta-analysis. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2012;113:618-627.
87. Tan SK, Lo J, Zwahlen RA. Peri-operative antibiotic prophylaxis in orthognathic surgery: a systematic review and meta-analysis of clinical trials. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;112:19-27.
88. Oomens MA, Verlinden CR, Goey Y, Forouzanfar T. Prescribing antibiotic prophylaxis in orthognathic surgery: a systematic review. *Int J Oral Maxillofac Surg* 2014;43:725-31.
89. Andreassen JO, Storgard Jensen S, Kofod T, Schwartz O, Hillerup S. Open or closed repositioning of mandibular fractures: is there a difference in healing outcome? A systematic review. *Dent Traumatol* 2008;24:17-21.
90. Adeyemo WL, Akadiri OA. A systematic review of the diagnostic role of ultrasonography in maxillofacial fractures. *Int J Oral Maxillofac Surg* 2011;40:655-61.
91. Andreassen JO, Jensen SS, Schwartz O, Hillerup Y. A systematic review of prophylactic antibiotics in the surgical treatment of maxillofacial fractures. *J Oral Maxillofac Surg* 2006;64:1664-8.
92. Hermund NU, Hillerup S, Kofod T, Schwartz O, Andreassen JO. Effect of early or delayed treatment upon healing of mandibular fractures: a systematic literature review. *Dent Traumatol* 2008;24:22-6.
93. Nussbaum ML, Laskin DM, Best AM. Closed versus open reduction of mandibular condylar fractures in adults: a meta-analysis. *J Oral Maxillofac Surg* 2008;66:1087-92.
94. Abdel-Galil K, Loukota R. Fractures of the mandibular condyle: evidence base and current concepts of manage-

- ment. *Br J Oral Maxillofac Surg* 2010;48:520-526.
95. Al-Moraissi EA, El-Sharkawy TM, El-Ghareeb TI, Chrcanovic BR. Three-dimensional versus standard miniplate fixation in the management of mandibular angle fractures: a systematic review and meta-analysis. *Int J Oral Maxillofac Surg* 2014;43:708-16.
 96. Day P, Duggal M. Interventions for treating traumatised permanent front teeth: avulsed (knocked out) and replanted. *Cochrane Database Syst Rev* 2010;Cd006542.
 97. Hinckfuss SE, Messer LB. An evidence-based assessment of the clinical guidelines for replanted avulsed teeth. Part II: prescription of systemic antibiotics. *Dent Traumatol* 2009;25:158-64.
 98. Hinckfuss SE, Messer LB. Splinting duration and periodontal outcomes for replanted avulsed teeth: a systematic review. *Dent Traumatol* 2009;25:150-7.
 99. Colella G, Cannavale R, Vicidomini A, Lanza A. Neurosensory disturbance of the inferior alveolar nerve after bilateral sagittal split osteotomy: a systematic review. *J Oral Maxillofac Surg* 2007;65:1707-15.
 100. Saltaji H, Major MP, Altalibi M, Youssef M, Flores-Mir C. Long-term skeletal stability after maxillary advancement with distraction osteogenesis in cleft lip and palate patients. *Angle Orthod* 2012;82:1115-22.
 101. Saltaji H, Major MP, Alfakir H, Al-Saleh MA, Flores-Mir C. Maxillary advancement with conventional orthognathic surgery in patients with cleft lip and palate: is it a stable technique? *J Oral Maxillofac Surg* 2012;70:2859-66.
 102. Hsieh YJ, Liao YF. Effects of maxil-lomandibular advancement on the upper airway and surrounding structures in patients with obstructive sleep apnoea: a systematic review. *Br J Oral Maxillofac Surg* 2013;51:834-840.
 103. Khamashta-Ledezma L, Naini FB. Systematic review of changes in maxillary incisor exposure and upper lip position with Le Fort I type osteotomies with or without cinch sutures and/or VY closures. *Int J Oral Maxillofac Surgery* 2014;43:46-61.
 104. Hunt OT, Johnston CD, Hepper PG, Burden DJ. The psychosocial impact of orthognathic surgery: a systematic review. *Am J Orthod Dentofacial Orthop* 2001;120:490-7.
 105. Joss CU, Joss-Vassalli IM, Berge SJ, Kuijpers-Jagtman AM. Soft tissue profile changes after bilateral sagittal split osteotomy for mandibular setback: a systematic review. *J Oral Maxillofac Surg* 2010;68:2792-801.
 106. de Gijt JP, Vervoorn K, Wolvius EB, Van der Wal KG, Koudstaal MJ. Mandibular midline distraction: a systematic review. *J Craniomaxillofac Surg* 2012;40:248-60.
 107. Lindenmeyer A, Sutcliffe P, Eghtessad M, Goulden R, Speculand B, Harris M. Oral and maxillofacial surgery and chronic painful temporomandibular disorders--a systematic review. *J Oral Maxillofac Surg* 2010;68:2755-64.
 108. Pirklbauer K, Russmueller G, Stiebellehner L, Nell C, Sinko K, Millesi G, et al. Maxillomandibular

- advancement for treatment of obstructive sleep apnea syndrome: a systematic review. *J Oral Maxillofac Surg* 2011;69:e165-76.
109. Solano-Hernandez B, Antonarakis GS, Scolozzi P, Kiliaridis S. Combined orthodontic and orthognathic surgical treatment for the correction of skeletal anterior open-bite malocclusion: a systematic review on vertical stability. *J Oral Maxillofac Surg* 2013;71:98-109.
110. Lagravere MO, Major PW, Flores-Mir C. Dental and skeletal changes following surgically assisted rapid maxillary expansion. *Int J Oral Maxillofac Surg* 2006;35:481-7.
111. Mensink G, Gooris PJ, Bergsma JE, van Hooft E, van Merkesteyn JP. Influence of BSSO surgical technique on postoperative inferior alveolar nerve hypoesthesia: a systematic review of the literature. *J Craniomaxillofac Surg* 2014.
112. Ow A, Cheung LK. Skeletal stability and complications of bilateral sagittal split osteotomies and mandibular distraction osteogenesis: an evidence-based review. *J Oral Maxillofac Surg* 2009;67:2344-53.
113. Pineiro-Aguilar A, Somoza-Martin M, Gandara-Rey JM, Garcia-Garcia A. Blood loss in orthognathic surgery: a systematic review. *J Oral Maxillofac Surg* 2011;69:885-92.
114. Sonogo CL, Bobrowski AN, Chagas OL, Jr., Torriani MA. Aesthetic and functional implications following rotation of the maxillomandibular complex in orthognathic surgery: a systematic review. *Int J Oral Maxillofac Surg* 2014;43:40-5.
115. Magalhaes IB, Pereira LJ, Marques LS, Gameiro GH. The influence of malocclusion on masticatory performance. A systematic review. *Angle Orthod* 2010;80:981-7.
116. Joss CU, Vassalli IM. Stability after bilateral sagittal split osteotomy advancement surgery with rigid internal fixation: a systematic review. *J Oral Maxillofac Surg* 2009;67:301-313.
117. Kaipatur N, Al-Thomali Y, Flores-Mir C. Accuracy of computer programs in predicting orthognathic surgery hard tissue response. *J Oral Maxillofac Surg* 2009;67:1628-39.
118. Kaipatur NR, Flores-Mir C. Accuracy of computer programs in predicting orthognathic surgery soft tissue response. *J Oral Maxillofac Surg* 2009;67:751-9.
119. Antonarakis GS, Christou P. Quantitative evaluation of neurosensory disturbance after bilateral sagittal split osteotomy using Semmes-Weinstein monofilaments: a systematic review. *J Oral Maxillofac Surg* 2012;70:2752-60.
120. Plooij JM, Maal TJJ, Haers P, Borstlap WA, Kuijpers-Jagtman AM, Bergé SJ. Digital three-dimensional image fusion processes for planning and evaluating orthodontics and ortho-gnathic surgery. A systematic

- review. *Int J Oral Maxillofac Surg* 2011;40:341-52.
121. Soh CL, Narayanan V. Quality of life assessment in patients with dentofacial deformity undergoing orthognathic surgery - a systematic review. *Int J Oral Maxillofac Surg* 2013;42:974-80.
122. Verstraaten J, Kuijpers-Jagtman AM, Mommaerts MY, Bergé SJ, Nada RM, Schols JGJH. A systematic review of the effects of bone-borne surgical assisted rapid maxillary expansion. *J Craniomaxillofac Surg* 2010;38:166-74.
123. Paes E, Molen A, Muradin M, Speleman L, Sloot F, Kon M, et al. A systematic review on the outcome of mandibular distraction osteogenesis in infants suffering Robin sequence. *Clin Oral Investig* 2013;17:1807-20.
124. Alanko OM, Svedstrom-Oristo AL, Tuomisto MT. Patients' perceptions of orthognathic treatment, well-being, and psychological or psychiatric status: a systematic review. *Acta Odontol Scand* 2010;68:249-60.
125. Caples SM, Rowley JA, Prinsell JR, Pallanch JF, Elamin MB, Katz SG, et al. Surgical modifications of the upper airway for obstructive sleep apnea in adults: a systematic review and meta-analysis. *Sleep* 2010;33:1396-407.
126. Chanchareonsook N, Samman N, Whitehill TL. The effect of cranio-maxillofacial osteotomies and distraction osteogenesis on speech and velopharyngeal status: a critical review. *Cleft Palate Craniofac J* 2006;43:477-87.
127. Stokbro K, Aagaard E, Torkov P, Bell RB, Thygesen T. Virtual planning in orthognathic surgery. *Int J Oral Maxillofac Surg* 2014;43:957-65.
128. Verlinden CR, van de Vijfeijken SE, Jansma EP, Becking AG, Swennen GR. Complications of mandibular distraction osteogenesis for congenital deformities: a systematic review of the literature and proposal of a new classification for complications. *Int J Oral Maxillofac Surg* 2014.
129. Greenlee GM, Huang GJ, Chen SS, Chen J, Koepsell T, Hujoel P. Stability of treatment for anterior open-bite malocclusion: a meta-analysis. *Am J Orthod Dentofacial Orthop* 2011;139:154-69.
130. Hassan T, Naini FB, Gill DS. The effects of orthognathic surgery on speech: a review. *J Oral Maxillofac Surg* 2007;65:2536-43.
131. Holty JE, Guilleminault C. Maxillo-mandibular advancement for the treatment of obstructive sleep apnea: a systematic review and meta-analysis. *Sleep Med Rev* 2010;14:287-97.
132. Khanna S, Dagum AB. A critical review of the literature and an evidence-based approach for life-threatening hemorrhage in maxillo-facial surgery. *Ann Plast Surg* 2012;69:474-8.
133. Hoogeveen EJ, Jansma J, Ren Y. Surgically facilitated orthodontic treatment: a systematic review. *Am J Orthod Dentofacial Orthop* 2014;145:S51-64.

134. Mucedero M, Coviello A, Baccetti T, Franchi L, Cozza P. Stability factors after double-jaw surgery in Class III malocclusion: a systematic review. *Angle Orthodontist* 2008;78:1141-52.
135. Gunarajah DR, Samman N. Biomaterials for repair of orbital floor blowout fractures: a systematic review. *J Oral Maxillofac Surg* 2013;71:550-70.
136. Al-Daghreer S, Flores-Mir C, El-Bialy T. Long-term stability after craniofacial distraction osteogenesis. *J Oral Maxillofac Surg* 2008;66:1812-9.
137. Araujo PPT, Oliveira KP, Montenegro SCL, Carreiro AFP, Silva JSP, Germano AR. Block Allograft for Reconstruction of Alveolar Bone Ridge in Implantology: A Systematic Review. *Implant Dent* 2013;22:304-8.
138. Mangano FG, Tettamanti L, Sammons RL, Azzi L, Caprioglio A, Macchi A, et al. Maxillary sinus augmentation with adult mesenchymal stem cells: a review of the current literature. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;115:717-23.
139. Oliver Klein M, Al-Nawas B. For which clinical indications in dental implantology is the use of bone substitute materials scientifically substantiated? Systematic review, consensus statements and recommendations of the 1st DGI Consensus Conference in September 2010, Aerzen, Germany. *Eur J Oral Implantol* 2011;4:S11-S29.
140. Plachokova AS, Nikolidakis D, Mulder J, Jansen JA, Creugers NHJ. Effect of platelet-rich plasma on bone regeneration in dentistry: a systematic review. *Clin Oral Implants Res* 2008;19:539-45.
141. Ribeiro-Rotta RF, Lindh C, Rohlin M. Efficacy of clinical methods to assess jawbone tissue prior to and during endosseous dental implant placement: a systematic literature review. *Int J Oral Maxillofac Implants* 2007;22:289-300.
142. Ricci L, Perrotti V, Ravera L, Scarano A, Piattelli A, Iezzi G. Rehabilitation of deficient alveolar ridges using titanium grids before and simultaneously with implant placement: a systematic review. *J Periodontol* 2013;84:1234-42.
143. Weng D, Stock V, Schliephake H. Are socket and ridge preservation techniques at the day of tooth extraction efficient in maintaining the tissues of the alveolar ridge? Systematic review, consensus statements and recommendations of the 1st DGI Consensus Conference in September 2010. *Eur J Oral Implantol* 2011;4:S59-S66.
144. Chanchareonsook N, Junker R, Jongpaiboonkit L, Jansen JA. Tissue-engineered mandibular bone reconstruction for continuity defects: a systematic approach to the literature. *Tissue Eng Part B Rev* 2014;20:147-62.
145. De Ceulaer J, De Clercq C, Swennen GR. Robotic surgery in oral and maxillofacial, craniofacial and head and neck surgery: a systematic review of the literature. *Int J Oral Maxillofac Surg* 2012;41:1311-24.
146. Delli K, Livas C, Sculean A, Katsaros C, Bornstein MM. Facts and myths regarding the maxillary midline frenum and its treatment: a systematic review of the literature. *Quintessence Int* 2013;44:177-87.

147. Herford AS, Stoffella E, Tandon R. Reconstruction of mandibular defects using bone morphogenic protein: can growth factors replace the need for autologous bone grafts? A systematic review of the literature. *Plast Surg Int* 2011;2011:165824.
148. Jakobsen C, Sorensen JA, Kassem M, Thygesen TH. Mesenchymal stem cells in oral reconstructive surgery: a systematic review of the literature. *J Oral Rehabil* 2013;40:693-706.
149. Pluijmers BI, Caron CJ, Dunaway DJ, Wolvius EB, Koudstaal MJ. Mandibular reconstruction in the growing patient with unilateral craniofacial microsomia: a systematic review. *Int J Oral Maxillofac Surg* 2013.
150. Sadr-Eshkevari P, Rashad A, Vahdati SA, Garajei A, Bohluli B, Maurer P. Alloplastic mandibular reconstruction: a systematic review and meta-analysis of the current century case series. *Plast Reconstr Surg* 2013;132:413e-27e.
151. Saulacic N, Iizuka T, Martin MS, Garcia AG. Alveolar distraction osteogenesis: a systematic review. *Int J Oral Maxillofac Surg* 2008;37:1-7.
152. van Hout WM, Mink van der Molen AB, Breugem CC, Koole R, Van Cann EM. Reconstruction of the alveolar cleft: can growth factor-aided tissue engineering replace autologous bone grafting? A literature review and systematic review of results obtained with bone morphogenetic protein-2. *Clin Oral Investig* 2011;15:297-303.
153. Freitas RM, Spin-Neto R, Marcantonio Junior E, Pereira LA, Wikesjo UM, Susin C. Alveolar ridge and maxillary sinus augmentation using rhBMP-2: a systematic review. *Clin Implant Dent Relat Res* 2015;17 suppl 1:e192-201.
154. Del Fabbro M, Bortolin M, Taschieri S, Weinstein RL. Effect of autologous growth factors in maxillary sinus augmentation: a systematic review. *Clin Implant Dent Relat Res* 2013; 15:205-16.
155. Gielkens PF, Bos RR, Raghoobar GM, Stegenga B. Is there evidence that barrier membranes prevent bone resorption in autologous bone grafts during the healing period? A systematic review. *Int J Oral Maxillofac Implants* 2007;22:390-8.
156. Jensen T, Schou S, Stavropoulos A, Terheyden H, Holmstrup P. Maxillary sinus floor augmentation with Bio-Oss or Bio-Oss mixed with autogenous bone as graft: a systematic review. *Clin Oral Implants Res* 2012;23:263-73.
157. Khojasteh A, Behnia H, Naghdi N, Esmaeelinejad M, Alikhassy Z, Stevens M. Effects of different growth factors and carriers on bone regeneration: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;116:e405-23.
158. Khojasteh A, Morad G, Behnia H. Clinical importance of recipient site characteristics for vertical ridge augmentation: a systematic review of literature and proposal of a classification. *J Oral Implantol* 2013;39: 386-98.
159. Rickert D, Slater JJ, Meijer HJ, Vissink A, Raghoobar GM. Maxillary sinus lift with solely autogenous bone compared to a combination of

- autogenous bone and growth factors or (solely) bone substitutes. A systematic review. *Int J Oral Maxillofac Surg* 2012;41:160-7.
160. Storgard Jensen S, Terheyden H. Bone augmentation procedures in localized defects in the alveolar ridge: clinical results with different bone grafts and bone-substitute materials. *Int J Oral Maxillofac Implants* 2009;24:218-236.
161. Chadha GK, Ahmadiéh A, Kumar S, Sedghizadeh PP. Osseointegration of dental implants and osteonecrosis of the jaw in patients treated with bisphosphonate therapy: a systematic review. *J Oral Implantol* 2013;39: 510-20.
162. Madrid C, Sanz M. What impact do systemically administrated bisphosphonates have on oral implant therapy? A systematic review. *Clin Oral Implants Res* 2009;20 Suppl 4:87-95.
163. Nooh N. Dental implant survival in irradiated oral cancer patients: a systematic review of the literature. *Int J Oral Maxillofac Implants* 2013; 28:1233-42.
164. Javed F, Al-Hezaimi K, Al-Rasheed A, Almas K, Romanos GE. Implant survival rate after oral cancer therapy: a review. *Oral Oncol* 2010;46:854-9.
165. Colella G, Cannavale R, Pentenero M, Gandolfo S. Oral implants in radiated patients: a systematic review. *Int J Oral Maxillofac Implants* 2007;22:616-22.
166. Ihde S, Kopp S, Gundlach K, Konstantinovic VS. Effects of radiation therapy on craniofacial and dental implants: a review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009;107:56-65.
167. Barber AJ, Butterworth CJ, Rogers SN. Systematic review of primary osseointegrated dental implants in head and neck oncology. *Br J Oral Maxillofac Surg* 2011;49:29-36.
168. Milinkovic I, Cordaro L. Are there specific indications for the different alveolar bone augmentation procedures for implant placement? A systematic review. *Int J Oral Maxillofac Surg* 2014;43:606-25.
169. Nkenke E, Stelzle F. Clinical outcomes of sinus floor augmentation for implant placement using autogenous bone or bone substitutes: a systematic review. *Clin Oral Implants Res* 2009; 20 Suppl 4:124-33.
170. Pjetursson BE, Tan WC, Zwahlen M, Lang NP. A systematic review of the success of sinus floor elevation and survival of implants inserted in combination with sinus floor elevation. *J Clin Periodontol* 2008;35:216-40.
171. Roffi A, Filardo G, Kon E, Marcacci M. Does PRP enhance bone integration with grafts, graft substitutes, or implants? A systematic review. *BMC Musculoskelet Disord* 2013;14:330.
172. Rocchietta I, Fontana F, Simion M. Clinical outcomes of vertical bone augmentation to enable dental implant placement: a systematic review. *J Clin Periodontol* 2008;35:203-15.
173. Tan WC, Lang NP, Zwahlen M, Pjetursson BE. A systematic review of the success of sinus floor elevation

- and survival of implants inserted in combination with sinus floor elevation. Part II: transalveolar technique. *J Clin Periodontol* 2008;35:241-54.
174. Clementini M, Morlupi A, Agrestini C, Barlattani A. Immediate versus delayed positioning of dental implants in guided bone regeneration or onlay graft regenerated areas: a systematic review. *Int J Oral Maxillofac Surg* 2013;42:643-50.
175. Clementini M, Morlupi A, Agrestini C, Ottria L. Success rate of dental implants inserted in autologous bone graft regenerated areas: a systematic review. *Oral Implantol (Rome)* 2011; 4:3-10.
176. Del Fabbro M, Corbella S, Weinstein T, Ceresoli V, Taschieri S. Implant survival rates after osteotome-mediated maxillary sinus augmentation: a systematic review. *Clin Implant Dent Relat Res* 2012;14 Suppl 1:e159-68.
177. Duttonhoefer F, Souren C, Menne D, Emmerich D, Schon R, Sauerbier S. Long-term survival of dental implants placed in the grafted maxillary sinus: systematic review and meta-analysis of treatment modalities. *PLoS One* 2013;8:e75357.
178. Arora NS, Ramanayake T, Ren YF, Romanos GE. Platelet-rich plasma in sinus augmentation procedures: a systematic literature review: Part II. *Implant Dent* 2010;19:145-57.
179. Călin C, Petre A, Drafta S. Osteotome-Mediated Sinus Floor Elevation: a systematic review and meta-analysis. *Int J Oral Maxillofac Implants* 2014;29:558-76.
180. Chan HL, Lin GH, Fu JH, Wang HL. Alterations in bone quality after socket preservation with grafting materials: a systematic review. *Int J Oral Maxillofac Implants* 2013;28:710-20.
181. Chrcanovic BR, Abreu MH. Survival and complications of zygomatic implants: a systematic review. *Oral Maxillofac Surg* 2013;17:81-93.
182. Chrcanovic BR, Pedrosa AR, Neto Custodio AL. Zygomatic implants: a critical review of the surgical techniques. *Oral Maxillofac Surg* 2013;17:1-9.
183. Waasdorp J, Reynolds MA. Allogeneic bone onlay grafts for alveolar ridge augmentation: a systematic review. *Int J Oral Maxillofac Implants* 2010; 25:525-31.
184. Goiato MC, Pellizzer EP, Moreno A, Gennari-Filho H, dos Santos DM, Santiago JF, et al. Implants in the zygomatic bone for maxillary prosthetic rehabilitation: a systematic review. *Int J Oral Maxillofac Surg* 2014;43:748-57.
185. Jung RE, Thoma DS, Hammerle CH. Assessment of the potential of growth factors for localized alveolar ridge augmentation: a systematic review. *J Clin Periodontol* 2008;35:255-81.
186. Klijn RJ, Meijer GJ, Bronkhorst EM, Jansen JA. Sinus floor augmentation surgery using autologous bone grafts from various donor sites: a meta-

- analysis of the total bone volume. *Tissue Eng Part B Rev* 2010;16:295-303.
187. Kuchler U, von Arx T. Horizontal ridge augmentation in conjunction with or prior to implant placement in the anterior maxilla: a systematic review. *Int J Oral Maxillofac Implants* 2014;29:14-24.
188. Pogrel MA, Montes DM. Is there a role for enucleation in the management of ameloblastoma? *Int J Oral Maxillofac Surg* 2009;38:807-12.
189. Poveda-Roda R, Bagan JV, Sanchis JM, Margaix M. Pseudotumors and tumors of the temporomandibular joint. A review. *Med Oral Patol Oral Cir Bucal* 2013;18:e392-402.
190. Johnson NR, Batstone MD, Savage NW. Management and recurrence of keratocystic odontogenic tumor: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;116:e271-6.
191. Blanas N, Freund B, Schwartz M, Furst IM. Systematic review of the treatment and prognosis of the odontogenic keratocyst. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000;90:553-8.
192. Kaczmarzyk T, Mojsa I, Stypulkowska J. A systematic review of the recurrence rate for keratocystic odontogenic tumour in relation to treatment modalities. *Int J Oral Maxillofac Surg* 2012;41:756-67.
193. Johnson NR, Gannon OM, Savage NW, Batstone MD. Frequency of odontogenic cysts and tumors: a systematic review. *J Investig Clin Dent* 2014;5:9-14.
194. Antonoglou GN, Sandor GK, Koidou VP, Papageorgiou SN. Non-syndromic and syndromic keratocystic odontogenic tumors: systematic review and meta-analysis of recurrences. *J Cranio-maxillofac Surg* 2014;42:e364-71.
195. Brasileiro CB, Abreu MH, Mesquita RA. Critical review of topical management of oral hairy leukoplakia. *World J Clin Cases* 2014;2:253-6.
196. Nabil S, Samman N. Incidence and prevention of osteoradionecrosis after dental extraction in irradiated patients: a systematic review. *Int J Oral Maxillofac Surg* 2011;40:229-43.
197. Nabil S, Samman N. Risk factors for osteoradionecrosis after head and neck radiation: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2012;113:54-69.
198. Pitak-Arnnop P, Sader R, Dhanuthai K, Masaratana P, Bertolus C, Chaine A, et al. Management of osteoradionecrosis of the jaws: an analysis of evidence. *Eur J Surg Oncol* 2008;34:1123-34.
199. Dijkstra PU, Kalk WW, Roodenburg JL. Trismus in head and neck oncology: a systematic review. *Oral Oncol* 2004;40:879-89.
200. Chrcanovic BR, Albrektsson T, Wennerberg A. Dental implants in irradiated versus non-irradiated patients: A meta-analysis. *Head Neck* 2014 Sep 20. Epub ahead of print.

201. Fritz GW, Gunsolley JC, Abubaker O, Laskin DM. Efficacy of pre- and postirradiation hyperbaric oxygen therapy in the prevention of postextraction osteoradionecrosis: a systematic review. *J Oral Maxillofac Surg* 2010;68:2653-60.
202. Chambrone L, Mandia J, Jr., Shibli JA, Romito GA, Abrahao M. Dental implants installed in irradiated jaws: a systematic review. *J Dent Res* 2013;92:119s-30s.
203. Bennett MH, Feldmeier J, Hampson N, Smee R, Milross C. Hyperbaric oxygen therapy for late radiation tissue injury. *Cochrane Database Syst Rev* 2012;5:Cd005005.
204. Al-Baghdadi M, Durham J, Steele J. Timing interventions in relation to temporomandibular joint closed lock duration: a systematic review of 'locking duration'. *J Oral Rehabil* 2014.
205. Guarda-Nardini L, Piccotti F, Ferronato G, Manfredini D. Synovial chondromatosis of the temporomandibular joint: a case description with systematic literature review. *Int J Oral Maxillofac Surg* 2010;39:745-55.
206. Katsnelson A, Markiewicz MR, Keith DA, Dodson TB. Operative management of temporomandibular joint ankylosis: a systematic review and meta-analysis. *J Oral Maxillofac Surg* 2012;70:531-6.
207. Limchaichana N, Petersson A, Rohlin M. The efficacy of magnetic resonance imaging in the diagnosis of degenerative and inflammatory temporomandibular joint disorders: a systematic literature review. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006;102:521-36.
208. Manfredini D, Piccotti F, Guarda-Nardini L. Hyaluronic acid in the treatment of TMJ disorders: a systematic review of the literature. *Cranio* 2010;28:166-76.
209. Mulder CH, Kalaykova SI, Gortzak RA. Coronoid process hyperplasia: a systematic review of the literature from 1995. *Int J Oral Maxillofac Surg* 2012;41:1483-9.
210. Saridin CP, Raijmakers PG, Tuinzing DB, Becking AG. Bone scintigraphy as a diagnostic method in unilateral hyperactivity of the mandibular condyles: a review and meta-analysis of the literature. *Int J Oral Maxillofac Surg* 2011;40:11-7.
211. Al-Moraissi EA. Arthroscopy versus arthrocentesis in the management of internal derangement of the temporomandibular joint: a systematic review and meta-analysis. *Int J Oral Maxillofac Surg* 2014.
212. te Veldhuis EC, te Veldhuis AH, Koudstaal MJ. Treatment management of children with juvenile idiopathic arthritis with temporomandibular joint involvement: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2014;117:581-89.e2.
213. Al-Riyami S, Moles DR, Cunningham SJ. Orthognathic treatment and temp-

- oromandibular disorders: a systematic review. Part 1. A new quality-assessment technique and analysis of study characteristics and classifications. *Am J Orthod Dentofacial Orthop* 2009;136:624.e1-15; discussion 624-5.
214. Gotfredsen K, Walls AW. What dentition assures oral function? *Clin Oral Implants Res* 2007;18 Suppl 3:34-45.
215. List T, Axelsson S. Management of TMD: evidence from systematic reviews and meta-analyses. *J Oral Rehabil* 2010;37:430-51.
216. Sharma A, Rahul GR. Zygomatic implants/fixture: a systematic review. *J Oral Implantol* 2013;39:215-24.
217. Riben C, Thor A. The maxillary sinus membrane elevation procedure: augmentation of bone around dental implants without grafts – a review of a surgical technique. *Int J Dent* 2012;2012:105483.
218. Coulthard P, Esposito M, Worthington HV, van der Elst M, van Waas OJ, Darcey J. Tissue adhesives for closure of surgical incisions. *Cochrane Database Syst Rev* 2010;Cd004287.
219. Manfredini D, Guarda-Nardini L. Ultrasonography of the temporomandibular joint: a literature review. *Int J Oral Maxillofac Surg* 2009;38:1229-36.
220. Morad G, Kheiri L, Khojasteh A. Dental pulp stem cells for in vivo bone regeneration: a systematic review of literature. *Arch Oral Biol* 2013;58:1818-27.
221. Raijmakers PG, Karssemakers LHE, Tuinzing DB. Female predominance and effect of gender on unilateral condylar hyperplasia: a review and meta-analysis. *J Oral Maxillofac Surg* (02782391) 2012;70:e72-6.
222. Sansare K, Raghav M, Mupparapu M, Mundada N, Karjodkar FR, Bansal S, et al. Keratocystic odontogenic tumor: systematic review with analysis of 72 additional cases from Mumbai, India. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;115:128-39.
223. van Diermen DE, van der Waal I, Hoogstraten J. Management recommendations for invasive dental treatment in patients using oral anti-thrombotic medication, including novel oral anticoagulants. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;116:709-16.
224. Wanner L, Manegold-Brauer G, Ulrich Brauer H. Review of unusual intraoperative and postoperative complications associated with endosseous implant placement. *Quin International* 2013;44:773-81.
225. Yueh-Ling C, Hsiu-His C, Chih-Chun M, Yu-Kang T, Hsein-Kun L. Meta-regression analysis of the initial bone height for predicting implant survival rates of two sinus elevation procedures. *J Clin Periodontol* 2010;37:456-65.
226. Schimmel M, Srinivasan M, Herrmann FR, Muller F. Loading protocols for implant-supported overdentures in the edentulous jaw: a systematic review and meta-analysis. *Int J Oral Maxillofac Implants* 2014; 29 Suppl:271-86.
227. Saltaji H, Altalibi M, Major MP, Al-Nuaimi MH, Tabbaa S, Major

- PW, et al. Le Fort III distraction osteogenesis versus conventional Le Fort III osteotomy in correction of syndromic midfacial hypoplasia: a systematic review. *J Oral Maxillofac Surg* 2014;72:959-72.
228. Schrott A, Riggi-Heiniger M, Maruo K, Gallucci GO. Implant loading protocols for partially edentulous patients with extended edentulous sites – a systematic review and meta-analysis. *Int J Oral Maxillofac Implants* 2014; 29 Suppl:239-55.
229. Shadid RM, Sadaqah NR, Othman SA. Does the implant surgical technique affect the primary and/or secondary stability of dental implants? a systematic review. *Int J Dent* 2014; 2014:204838.
230. Shelley AM, Glenny AM, Goodwin M, Brunton P, Horner K. Conventional radiography and cross-sectional imaging when planning dental implants in the anterior edentulous mandible to support an overdenture: a systematic review. *Dentomaxillofac Radiol* 2014;43:20130321.
231. Smektala T, Jedrzejewski M, Szyndel J, Sporniak-Tutak K, Olszewski R. Experimental and clinical assessment of three-dimensional cephalometry: A systematic review. *J Craniomaxillofac Surg* 2014.
232. Su M, Shi B, Zhu Y, Guo Y, Zhang Y, Xia H, et al. Comparison of implant success rates with different loading protocols: a meta-analysis. *Int J Oral Maxillofac Implants* 2014;29:344-52.
233. Tahmaseb A, Wismeijer D, Coucke W, Derksen W. Computer technology applications in surgical implant dentistry: a systematic review. *Int J Oral Maxillofac Implants* 2014;29:25-42.
234. Tang Y, Li X, Yin S. Outcomes of MTA as root-end filling in endodontic surgery: a systematic review. *Quintessence Int* 2010;41:557-66.
235. Thoma DS, Buranawat B, Hämmerle CHF, Held U, Jung RE. Efficacy of soft tissue augmentation around dental implants and in partially edentulous areas: a systematic review. *J Clin Periodontol* 2014;41:S77-91.
236. Tong D, Theis JC. Antibiotic prophylaxis and invasive dental treatment in prosthetic joint patients. *N Z Med J* 2008;121:45-52.
237. Tuna T, Yorgidis M, Strub JR. Prognosis of implants and fixed restorations after lateral sinus elevation: a literature review. *J Oral Rehabil* 2012;39:226-38.
238. Wermker K, Jung S, Joos U, Kleinheinz J. Dental implants in cleft lip, alveolus, and palate patients: a systematic review. *Int J Oral Maxillofac Implants* 2014;29:384-90.
239. Bonito AJ, Palton LL, Shugars DA, Lohr KN, Nelson JP, Bader JD, et al. Management of dental patients who are HIV-positive: antifungal treatments. Rockville, MD, USA: Agency for Healthcare Research and Quality. Evidence Report/Technology Assessment; 37. 2002.

240. Esposito M, Grusovin MG, Rees J, Karasoulos D, Felice P, Alissa R, et al. Interventions for replacing missing teeth: augmentation procedures of the maxillary sinus. *Cochrane Database Syst Rev* 2010: Cd008397.
241. Li C, Su N, Yang X, Shi Z, Li L. Ultrasonography for detection of disc displacement of temporomandibular joint: a systematic review and meta-analysis. *J Oral Maxillofac Surg* 2012;70:1300-09.
242. Li C, Zhang Y, Lv J, Shi Z. Inferior or double joint spaces injection versus superior joint space injection for temporomandibular disorders: a systematic review and meta-analysis. *J Oral Maxillofac Surg* 2012;70:37-44.
243. Moore RA, Derry S, McQuay HJ, Wiffen PJ. Single dose oral analgesics for acute postoperative pain in adults. *Cochrane Database Syst Rev* 2011: Cd008659.
244. Martinez-Zapata MJ, Marti-Carvajal A, Sola I, Bolibar I, Angel Exposito J, Rodriguez L, et al. Efficacy and safety of the use of autologous plasma rich in platelets for tissue regeneration: a systematic review. *Transfusion* 2009;49:44-56.
245. Patton LL, Shugars DA, Bonito AJ. A systematic review of complication risks for HIV-positive patients undergoing invasive dental procedures. *J Am Dent Assoc* 2002;133:195-203.
246. Liu Y, Bai N, Song G, Zhang X, Hu J, Zhu S, et al. Open versus closed treatment of unilateral moderately displaced mandibular condylar fractures: a meta-analysis of randomized controlled trials. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2013;116:169-73.
247. Abrahamsson C, Ekberg E, Henrikson T, Bondemark L. Alterations of temporomandibular disorders before and after orthognathic surgery: a systematic review. *Angle Orthod* 2007;77: 729-34.
248. Baccaglioni L, Atkinson JC, Patton LL, Glick M, Ficarra G, Peterson DE. Management of oral lesions in HIV-positive patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 103:S50.e1-23.