American Society of Regional Anesthesia (et. al.) Steroid Guidelines Updates

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Status of Current Guidelines

- Use of corticosteroids for adult chronic pain interventions: sympathetic and peripheral nerve blocks, trigger point injections [ASRA, AAPM, ASIPP, IPSIS] – RAPM 2024

- Use and safety of corticosteroid injections in joints and musculoskeletal soft tissue [ASRA, AAPM, ASIPP, IPSIS] – RAPM 2025

- Multi-society multi-specialty practice guideline on the safety of corticosteroid injections for facet joint and sacroiliac joint pain and the safety of vaccine administration in the presence of corticosteroid injections [ASRA*, AAPM*, ACR**, AAOS**, AAPMR***, ASIPP***, NASS***] – *in progress*

* sponsors
** provided content experts, voters
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Use of corticosteroids for adult chronic pain interventions: sympathetic and peripheral nerve blocks, trigger point injections - guidelines from the American Society of Regional Anesthesia and Pain Medicine, the American Academy of Pain Medicine, the American Society of Interventional Pain Physicians, and the International Pain and Spine Intervention Society

Benzon HT, *et al*. *Reg Anesth Pain Med* 2024;**0**:1–18. doi:10.1136/rapm-2024-105593

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Table 1 United States Preventive Services Task Force (USPSTF) Grades and Levels of Certainty Regarding Net Benefit

Grade	Definitions
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate, or there is moderate certainty that the net benefit is moderate to substantial.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.
I	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.

Level of certainty	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by such factors as: the number, size, or quality of individual studies, inconsistency of findings across individual studies, limited generalizability of findings to routine primary care practice, lack of coherence in the chain of evidence. As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of the limited number or size of studies, important flaws in study design or methods, inconsistency of findings across individual studies, gaps in the chain of evidence, findings not generalizable to routine primary care practice, and lack of information on important health outcomes. More information may allow estimation of effects on health outcomes.

The USPSTF defines certainty as 'likelihood that the USPSTF assessment of the net benefit of a preventive service is correct'. The net benefit is defined as benefit minus harm of the preventive service as implemented in a general, primary care population. The USPSTF assigns a certainty level based on the nature of the overall evidence available to assess the net benefit of a preventive service.

From: Harris *et al*.[7]

Box 1 Statements and recommendations on the safety of steroid injections in sympathetic nerve blocks

Statements

1. Sympathetic blocks may provide pain relief with or without the addition of corticosteroid in the injectate.
   Level of certainty: moderate
2. Use of particulate corticosteroids in stellate ganglion blocks may cause central nervous system injury.
   Level of certainty: low
3. Reported pain relief after stellate ganglion block is similar if performed under fluoroscopy or ultrasound guidance.
   Level of certainty: moderate
4. Image guidance may help decrease complications and improve accuracy of sympathetic blocks, including visceral sympathetic blocks.
   Level of certainty: moderate

Recommendations

1. Local anesthetic alone is sufficient for performing sympathetic blocks for pain relief.
   Grade C
2. Imaging guidance with ultrasound or fluoroscopy is recommended for the performance of sympathetic blocks, with ultrasound permitting visualization of vascular structures.
   Grade B

Box 2 Statements and recommendations on the safety of corticosteroid injections in greater occipital nerve blocks

Statements

1. The proximal approach has only been described with an ultrasound technique. Image guidance may improve the efficacy of the distal approach to greater occipital nerve blocks compared with a non-image-guided approach.
   Level of certainty: low
2. With ultrasound guidance, both the classic/distal approach and the proximal approach appear to be effective for greater occipital nerve blocks.
   Level of certainty: moderate
3. The proximal approach may provide more sustained benefit compared with the distal approach.
   Level of certainty: low
4. The addition of corticosteroid to the local anesthetic improve outcomes compared with local anesthetic alone or saline when performing greater occipital nerve blocks for patients with cluster headaches.
   Level of certainty: moderate
5. Local anesthetic alone yields similar outcomes compared with local anesthetic with corticosteroid when performing greater occipital nerve blocks for patients with migraine and medication overuse headaches.
   Level of certainty: moderate

Recommendations

1. Consider using ultrasound when performing greater occipital nerve blocks. Clinicians may choose either the classic/distal or the proximal approach to greater occipital nerve block, but the latter should be performed with ultrasound guidance.
   Grade A
2. The addition of corticosteroid to the local anesthetic is preferred in greater occipital nerve blocks for cluster headache.
   Grade C
3. Clinicians should avoid the use of corticosteroids in greater occipital nerve blocks for migraine and medication overuse headache.
   Grade D
4. Clinicians should monitor and limit the number and frequency of greater occipital nerve blocks with corticosteroids to avoid side-effects.
   Grade B

Box 3 Statements and recommendations on safety of corticosteroid injections in chest wall blocks, transversus abdominis plane blocks, and ilioinguinal/iliohypogastric nerve blocks

Statements

Chest wall blocks

1. Image-guided techniques are more accurate than landmark techniques. With US, one can visualize the target tissue and the pleura while one can better mark the levels with fluoroscopy.
   Level of certainty: high
2. There are no significant differences in outcomes between US-guided and fluoroscopy-guided intercostal and paravertebral injections.
   Level of certainty: high
3. Patient-specific clinical data, including diagnosis, comorbidities, response to previous injections, and other relevant clinical information determine the frequency and number of blocks.
   Level of certainty: low

Recommendations

1. An image-guided technique is preferred for intercostal and paravertebral blocks to improve accuracy of injections.
   Grade C
2. US guidance is preferable to fluoroscopy for intercostal and paravertebral injections because the pleura and target tissue are visualized.
   Grade C
3. Non-particulate corticosteroids are preferred over particulate corticosteroids for proximal intercostal or paravertebral injections to avoid the rare risk of vascular uptake that may result in spinal cord injury.
   Grade C

Transversus abdominis plane blocks

Statements

1. Transversus abdominis plane blocks with ultrasound guidance are more accurate than landmark-based techniques.
   Level of certainty: moderate

Recommendations

1. Transversus abdominis plane blocks are preferably conducted with ultrasound to ensure accurate placement of injectate.
   Grade B

Ilioinguinal/iliohypogastric nerve blocks

Statements

1. Ilioinguinal/iliohypogastric blocks performed under ultrasound are more accurate than landmark-guided techniques.
   Level of certainty: moderate
2. Ilioinguinal/iliohypogastric injections performed with image-based or landmark-based techniques have similar efficacy and safety outcomes.
   Level of certainty: low

Recommendations

1. Clinicians may consider ultrasound guidance for ilioinguinal/iliohypogastric injections for more accurate placement.
   Grade B

Box 4 Statements and recommendations on the safety of corticosteroid injections in upper extremity and lower extremity injections

Upper extremity injections—carpal tunnel syndrome
Statements
1. Ultrasound guidance for *carpal tunnel syndrome* injections confer a small benefit as compared with landmark-based injections regarding functional improvement and pain.
   Level of certainty: low

Recommendations
1. Clinicians may consider *carpal tunnel injections* with ultrasound guidance.
   Grade C

Lower extremity injections
Statements
1. For lower extremity peripheral nerve injections, ultrasound guidance is superior to nerve stimulator guidance and landmark-based techniques with regards to pain reduction.
   Level of certainty: high
2. The use of corticosteroid adjuvants in pudendal nerve blocks for the management of pain of chronic pudendal neuralgia does not prolong the benefit of an injection performed with local anesthetic alone.
   Level of certainty: moderate
3. Results are better when Morton's neuroma injections are done under US compared with landmark technique.
   Level of certainty: moderate
4. Morton's neuroma injections with corticosteroids have a 50% likelihood of achieving satisfactory relief at a 1-year follow-up.
   Level of certainty: moderate

Recommendations
1. Clinicians should preferably use ultrasound guidance, compared with nerve stimulator guidance and landmark-based techniques, when performing lower extremity peripheral nerve injections given the improved efficacy compared with other forms of visualization.
   Grade A
2. When performing pudendal nerve injections for chronic pudendal neuralgia, clinicians should consider avoiding the use of corticosteroids as they do not prolong the benefit associated with local anesthetic alone.
   Grade D
3. Morton's neuroma injections should be performed with ultrasound guidance rather than landmark-based guidance.
   Grade C
4. When performing Morton's neuroma injections, clinicians should use corticosteroids with the local anesthetic.
   Grade B

Please see text for comparative efficacy of corticosteroid to other injectates in carpal tunnel syndrome

Box 5 Statements and recommendations on the safety of corticosteroid use in trigger point injections

Statements

1. Ultrasound can visualize neurovascular structures and may result in more accurate targeting of trigger point injections in deeper anatomic locations
   Level of certainty: moderate

Recommendations

1. Trigger point injections can be conducted based on palpation alone or with ultrasound, which may improve accuracy of injection.
   Grade C
2. Clinicians may consider ultrasound guidance for trigger point injections conducted in areas near high-risk tissues (risk of neural, vascular, pulmonary, or visceral injury) or in trigger points located in deeper anatomic locations
   Grade C

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Statements

1. The addition of corticosteroid to a local anesthetic does not result in increased benefit that outweighs the potential risks.
   Level of certainty: moderate

Recommendations

1. The use of local anesthetic alone should be considered for trigger point injections.
   Grade B

Table 2 Commonly used doses of corticosteroids

Study, reference number	Block/injection	Corticosteroid, dose injected
Peres *et al*; Ambrossini *et al*[67 73]	Greater occipital nerve block, cluster headache*	Triamcinolone, 40 mg Betamethasone dipropionate, 12.46 mg and betamethasone phosphate, 5.26 mg† (study from Italy and Belgium)
Saglam *et al*; Okur *et al*[120 128]	Suprascapular block for chronic shoulder pain	Triamcinolone, 40 mg Triamcinolone, 20 mg
Abd-Elsayed[111 112]	Transversus abdominis plane block for chronic abdominal pain	Triamcinolone, 80 mg (bilateral) Triamcinolone, 40 mg (unilateral)
Khan *et al*, (scoping review of 5 studies)[117]	Ilioinguinal, iliohypogastric, genitofemoral nerve block for postherniorrhaphy pain	Methylprednisolone, 20 mg Methylprednisolone, 40 mg Triamcinolone, 40 mg Triamcinolone, 80 mg Cortivazol, 3.75 mg (Triamcinolone 50 mg equivalent)
Moya Esteban[193]	Vaginal trigger point injection	Betamethasone acetate, 2 mL† (study from Spain)
Saygi *et al*; Markovic *et al*;, Thomson *et al*[154–156]	Morton's neuroma	Methylprednisolone, 40 g Celestone chronodose, 1 mL, 5.7 mg/mL* (study from Australia) Methylprednisolone, 40 mg

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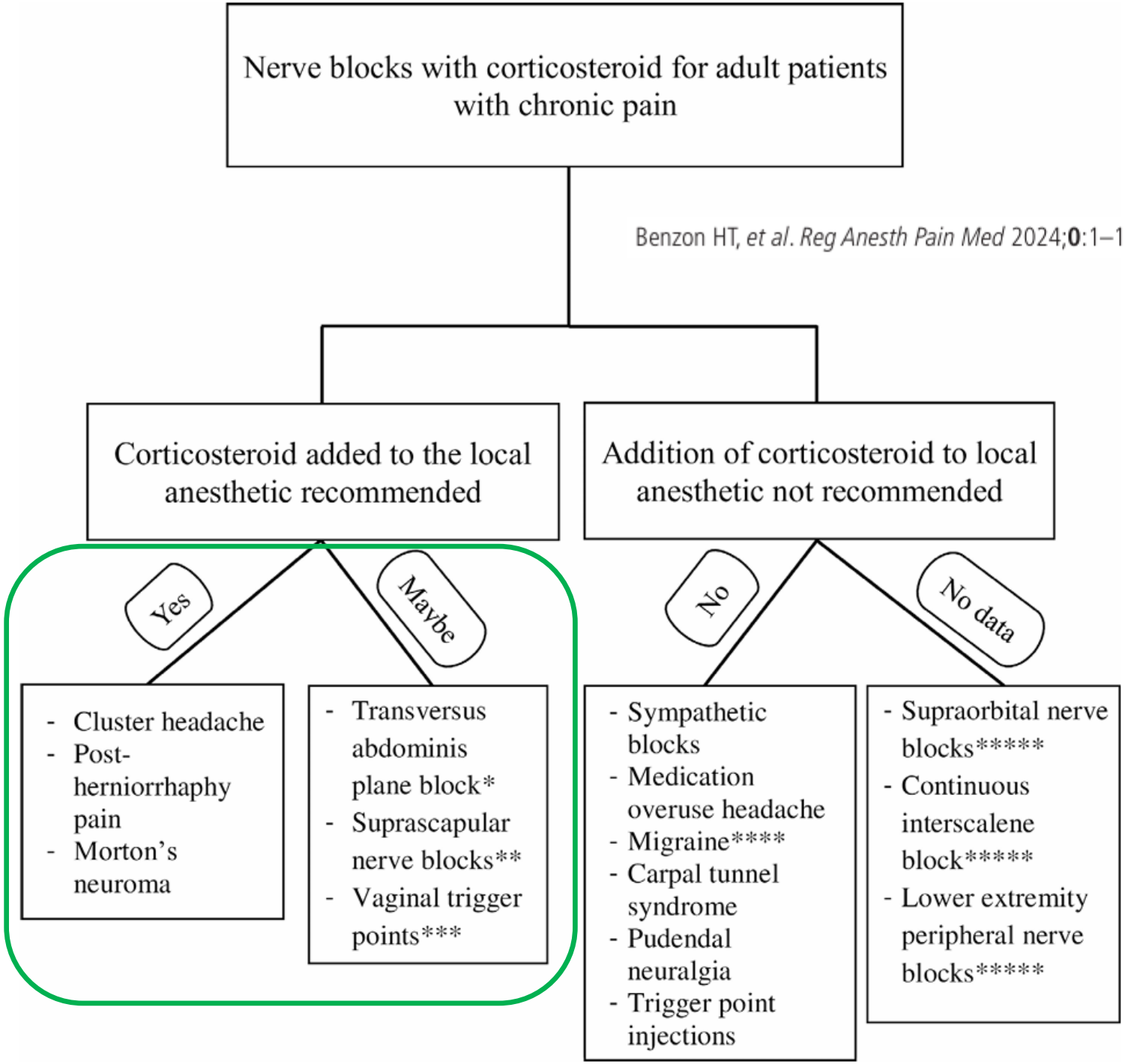

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Use and safety of corticosteroid injections in joints and musculoskeletal soft tissue: guidelines from the American Society of Regional Anesthesia and Pain Medicine, the American Academy of Pain Medicine, the American Society of Interventional Pain Physicians, and the International Pain and Spine Intervention Society

Honorio T Benzon ,[1] David Anthony Provenzano ,[2] Ameet Nagpal ,[3] Dmitri Souza,[4] Maxim S Eckmann,[5] Ariana M Nelson ,[6,7] Maged Mina,[5] Alaa Abd-Elsayed,[8] Dalia Elmofty,[9] Andrea L Chadwick ,[10] Tina L Doshi ,[11] Carlos A Pino ,[12] Maunak Rana,[9] Shalini Shah,[13] Hariharan Shankar ,[14] Alison Stout,[15] Elizabeth Smith,[16] Salahadin Abdi,[17] Steven P Cohen ,[18] Joshua A Hirsch,[19] Byron J Schneider,[20] Laxmaiah Manchikanti,[21] Timothy P Maus,[22] Samer Narouze ,[23] Harsha Shanthanna ,[24] Ajay D Wasan,[25] Thanh D Hoang,[26] Jessica Rivera,[27] Christine Hunt ,[28] John D FitzGerald[29]

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Table 3 Recommendations of national organizations on the usefulness of hip and knee intra-articular corticosteroid injections

Organization	Knee	Hip
American College of Rheumatology	Recommended	Recommended
American Academy of Orthopedic Surgeons	Could be considered	Could provide short-term relief
European League Against Rheumatism	Recommended	May be considered
Osteoarthritis Research Society International	Conditionally recommended	Not commented

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Box 1 Absolute and relative contraindications to intra-articular and soft tissue corticosteroid injections

Absolute contraindications

⇒ Overlying skin infection
⇒ (Suspected) infectious arthritis
⇒ Fracture site
⇒ (Suspected) bacteremia
⇒ Hypersensitivity or allergic reactions to previous corticosteroid injectables.

Relative contraindications

⇒ Previous lack of efficacy
⇒ Severely immunocompromised status
⇒ Coagulopathy
⇒ Joint prosthesis
⇒ Poorly controlled diabetes

Box 2 Statements and recommendations on corticosteroid pharmacology

Choice of corticosteroid

Statements

1. The three most used corticosteroid preparations for intra-articular injection are methylprednisolone acetate, triamcinolone hexacetonide, and triamcinolone acetonide.
   Level of certainty: moderate
2. Various corticosteroid preparations have similar effectiveness but may differ in their duration of action.
   Level of certainty: moderate
3. Extended-release corticosteroid preparations have not demonstrated clinical superiority to standard preparations except for improved blood glucose stability in populations with diabetes.
   Level of certainty: moderate

Recommendation

⇒ There is insufficient evidence to recommend one preparation of intra-articular corticosteroid over another.
Grade I

Relief from corticosteroid injections

Statement

⇒ Corticosteroid joint injections can provide short-term pain relief and improvement in function.
Level of certainty: moderate

Recommendation

⇒ Corticosteroid joint injections can be used for short-term relief in patients with symptomatic inflammatory or degenerative arthritis.
Grade C

Box 3 Statements and recommendations on the role of imaging in intra-articular corticosteroid injections

Role of imaging

Statements

1. Ultrasound-guided techniques result in more accurate intra-articular needle placement than landmark-based techniques.
   Level of certainty: high
2. There are no significant differences in accuracy between ultrasound-guided and fluoroscopy-guided peripheral joint corticosteroid injections.
   Level of certainty: low
3. Compared with landmark-based techniques, use of image guidance may be associated with less pain on injection, improved patient satisfaction, and better short-term clinical outcomes.
   Level of certainty: low
4. Use of imaging guidance may be associated with fewer adverse events, including damage to periosteum and intravascular injection, after diagnostic or therapeutic arthrocentesis.
   Level of certainty: low

Recommendation

1. Image-guided techniques may be preferred for accuracy of intra-articular corticosteroid injections, especially in individuals with morbid obesity.
   Grade C

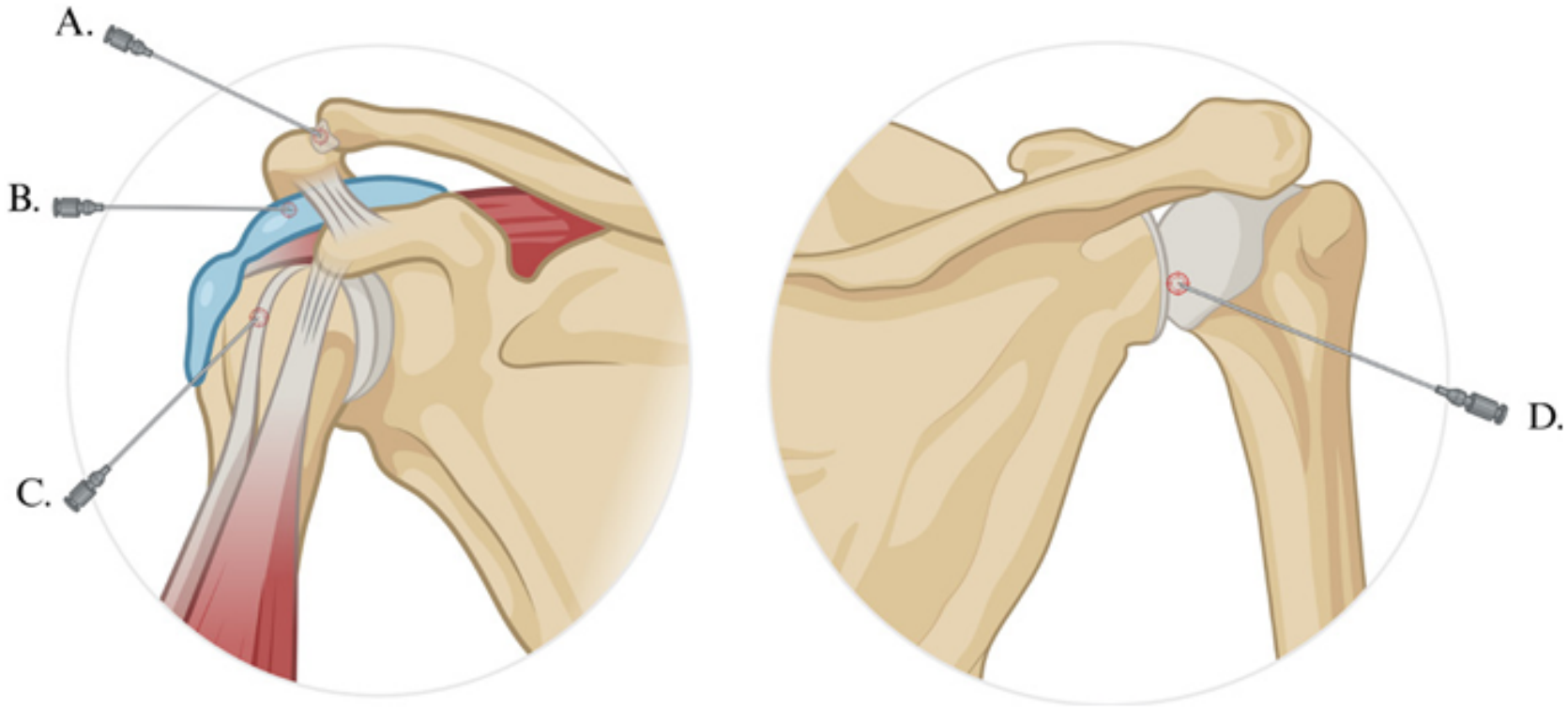

Figure 1 Injection sites for shoulder pain. A—acromioclavicular joint; B—subacromial subdeltoid bursa; C—long head of the biceps tendon; D—glenohumeral joint. Note that the injection is around the biceps tendon or tendon sheath. Image courtesy of Sebastian Encalada, MD, Mayo Clinic, Jacksonville, Florida.

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Box 4 Statements and recommendations on intra-articular corticosteroid injections in shoulder and elbow

Shoulder joints

Statements

1. Lower corticosteroid doses equivalent to 20 mg triamcinolone or methylprednisolone in IACS and SASDB shoulder injections are equally effective as higher corticosteroid doses.
   Level of certainty: moderate
2. Corticosteroid injection (CSI) of the shoulder provides short-term improvement (up to 8 weeks) in pain and disability over no treatment or placebo for painful shoulder disorders and should be considered for adhesive capsulitis (AC) and other painful disorders of the shoulder (subacromial subdeltoid impingement syndrome, subacromial subdeltoid bursitis, biceps tendinopathy).
   Level of certainty: high
3. Physical therapy or home exercise, in conjunction with CSI of the shoulder, is beneficial for painful shoulder disorders, including AC and subacromial bursitis.
   Level of certainty: moderate

Recommendations

1. The recommended initial CSI can be performed with corticosteroid equivalent not exceeding 20 mg triamcinolone or methylprednisolone.
   Grade B
2. Shoulder CSI should be offered for short-term pain relief of moderate-to-severe pain, disability from shoulder impingement syndrome, bursitis, rotator cuff tendonitis, or tendinopathy if no other conservative treatment options are available or successful.
   Grade B
3. Physical therapy or home exercises should be offered in conjunction with shoulder CSI.
   Grade B

Tendinitis/Tendinosis of the long head of the biceps

Statements

1. For biceps tendon injections, ultrasound (US)-guided injections improve accuracy, pain relief, and functional outcomes compared with landmark techniques.
   Level of certainty: high
2. US-guided injections provide higher accuracy of injections than fluoroscopy-guided injections, with similar analgesic benefit.
   Level of certainty: low

Recommendations

1. US guidance is recommended over landmark technique for peritendinous injection of the long head of the biceps.
   Grade A
2. Fluoroscopy guidance is recommended over landmark technique for peritendinous injection of the long head of the biceps.
   Grade B

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Elbow joint

Statements

1. Extra-articular CSI are effective in the short term for treatment of lateral epicondylosis.
   Level of certainty: low
2. There is no evidence to support long-term benefit for CSI for epicondylosis compared with conservative management or PT. The long-term improvement may reflect the natural history of the condition.
   Level of certainty: low
3. For non-septic olecranon bursitis, aspiration followed by CSI is safe and may result in earlier improvement in symptoms compared with aspiration alone or compression with bandaging.
   Level of certainty: low

Recommendations

1. An administration of CSI may be considered for short-term treatment of pain due to *lateral epicondylosis* unless contraindicated.
   Grade C
2. Aspiration with injection of corticosteroid may be offered for non-septic olecranon bursitis.
   Grade B

Box 5 Statements and recommendations on intra-articular corticosteroid (IACS) injections in hip and knee joints

Hip injections

Statements

1. IACS hip injections are commonly performed procedures that can be used as a diagnostic tool in pain due to hip osteoarthritis or as a treatment modality for short-term (4–12 weeks) pain relief.
   Level of certainty: high
2. Potential adverse effects of standard doses of IACS hip injections may include accelerated cartilage loss, subchondral insufficiency fractures, osteonecrosis, and rarely rapid joint destruction.
   Level of certainty: moderate
3. Pre-injection/screening X-ray of the hip joint may help to verify baseline pathology, for example, osteonecrosis with preserved femoral head, that would preclude corticosteroid injection.*
   Level of certainty: moderate
4. Education and exercise, in conjunction with IACS, result in better global improvement than IACS alone in patients with greater trochanter pain syndrome at 1 year postintervention. Pain relief is similar after both interventions.
   Level of certainty: low
5. Safety and accuracy of greater trochanteric bursa corticosteroid injections are similar across injections performed using landmarks, fluoroscopy, or ultrasound.
   Level of certainty: moderate

Recommendations

1. Caution should be taken with intra-articular hip injections using high-dose corticosteroids and multiple injections. Consider using the lowest effective dose of corticosteroids for IACS of the hip while extending the time interval between repeat CSI.
   Grade B
2. Consider using a 40 mg dose of triamcinolone or comparable dose of another corticosteroid for IACS hip injection.
   Grade B
3. Pre-injection/Screening X-ray of the hip joint should be performed prior to IACS hip injection to verify baseline pathology including osteonecrosis.*
   Grade B
4. Patient education and home physical therapy exercises should be offered in conjunction with or prior to CSI for greater trochanter pain syndrome.
   Grade B
5. Hip trochanteric bursa injections can be performed using landmark guidance.
   Grade B

Knee injections

Statements

1. The lowest effective dose for triamcinolone acetate and methylprednisolone acetate is 40 mg. TA and MPA are non-superior in comparison with each other; both are similarly effective for the clinical treatment of knee arthritis.
   Level of certainty: high

2. Repeat IACS are associated with small volume cartilage loss, with the effect likelihood and size increasing with higher doses and/or extended duration of therapy.*
   Level of certainty: high

Recommendations

1. IACS for knee osteoarthritis should use the lowest effective doses of corticosteroids while increasing the time interval between repeat injections when possible.
   Grade A
2. The recommended initial maximum intra-articular knee triamcinolone acetonide dose is 40 mg, or another particulate corticosteroid equivalent.
   Grade A

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Table 4 Clinical tests in greater trochanteric pain syndrome

Diagnosis	Test	Description
Greater trochanteric bursitis	Jump sign	Severe sensitivity and intense pai 'jump off' the bed.
Gluteus medius/minimus tendinopathy	FABER test	Ipsilateral hip pain with flexion, a
	Ossendorf test	Patient in lateral position, the kne by the investigator. The patient is no internal rotation is possible, th
	Hip lag sign	Patient in lateral position, with th the pelvis. The hip is passively ext position. The patient is asked to h abducted, internally rotated posit
Internal snapping hip (iliopsoas tendon/bursa)	Thomas test	Patient lies supine and pulls the u fully extended on the examinatio
	Stincfield test	Patient lies supine with the hip at is reproduced.
External snapping hip (iliotibial band)	Ober test	Patient lies on the non-painful sic anterior groin pain with visible or
	Hula-hoop test	Patient stands with adduction an trochanter.

Ossendorf test and Hip Lag Sign are tests of hip abductor muscle (gluteus med

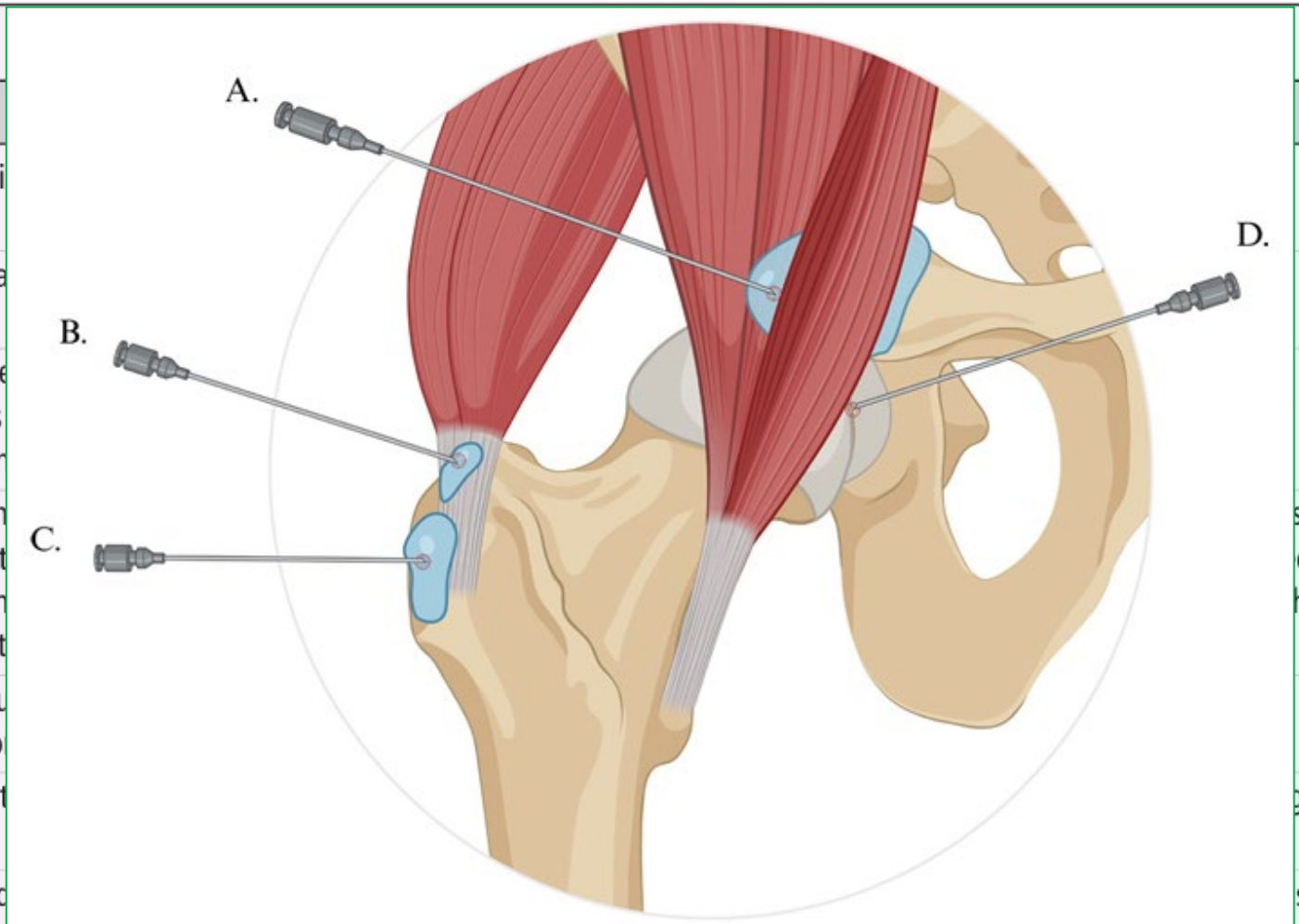

Figure 2 Injection sites for hip pain. A—iliopsoas bursa; B—gluteus medius/minimus tendon sheath; C—greater trochanter bursa; D—hip joint. Note that the injection is around the gluteus medius/minimus tendon or tendon sheath. Image courtesy of Sebastian Encalada, MD, Mayo Clinic, Jacksonville, Florida.

Box 6 Statements and recommendations on small joint injections

Statements

1. Ultrasound (US) guidance is superior to landmark-based guidance when performing small joint injections.
   Level of certainty: high
2. The use of intra-articular corticosteroid (IACS) injection in the treatment of *osteoarthritis* of *the carpometacarpal joints* of the hands and wrists does not result in short-term or long-term improvement in pain or function. IACS results in less pain with movement in patients with *interphalangeal joints of the hand*.
   Level of certainty: moderate
3. The use of IACS in the treatment of *rheumatoid arthritis* of the joints of the hands and wrists results in short-term (12 weeks) or long-term (12 months) improvement in pain, function, and inflammation.
   Level of certainty: high
4. Trigger finger corticosteroid injection (CSI) confers a short-term to intermediate-term (3–6 months) benefit in resolving symptoms.
   Level of certainty: moderate
5. Triamcinolone, 20 mg, is superior to 5 mg and 10 mg for trigger finger injections.
   Level of certainty: low
6. De Quervain's tenosynovitis improves with CSI in the short term, and the addition of a thumb splint to the steroid injection leads to intermediate-term improvement.
   Level of certainty: moderate
7. Plantar fascia injections with corticosteroids are not superior to placebo injections in *non-inflammatory* plantar heel pain.
   Level of certainty: moderate
8. In rheumatic *inflammatory diseases* such as spondyloarthritis, plantar fascia injections with corticosteroids are beneficial in the treatment of pain and inflammation.
   Level of certainty: low

Recommendations

1. Clinicians should preferably offer US guidance when performing injections into the small joints of the wrists, hands, feet, and ankles, as it may provide benefit (eg, reduced procedural pain) over landmark-based guidance.
   Grade C
2. In patients with active *rheumatoid arthritis* in the small joints of the wrists and hands, IACSCSI may be used as an adjunct therapy to decrease pain, improve function, and reduce signs and symptoms of inflammation.
   Grade C
3. Clinicians should perform CSI for *trigger finger* with 20 mg triamcinolone/methylprednisolone corticosteroid equivalent rather than 5 or 10 mg.
   Grade C
4. Clinicians should offer thumb splints in conjunction with CSI for De Quervain's tenosynovitis.
   Grade C
5. Clinicians may perform plantar fascia injections with corticosteroids for *rheumatic inflammatory heel pain* not responsive to conservative measures.
   Grade C
6. Avoid plantar fascia injections with corticosteroids for *non-inflammatory plantar heel pain*.
   Grade D

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Box 7 Statements and recommendations on adverse events from intra-articular corticosteroid (IACS) injections

Statements

1. Clinically significant increases in blood glucose may follow IACS injection, particularly in patients with diabetes mellitus. These effects are noted within hours of IACS, but peak blood glucose may be delayed for up to 2 days after IACS.
   Level of certainty: high
2. Extended-release corticosteroid preparations may mitigate the impact of IACS on systemic blood glucose in patients with diabetes.
   Level of certainty: moderate
3. Adrenal suppression may follow an intra-articular corticosteroid injection.
   Level of certainty: moderate
4. For warfarin, in patients with an international normalization ratio (INR) in the therapeutic range (2.0–3.0), the risks of withholding anticoagulation prior to IACS related to the development of a thromboembolic event are greater than the risks of bleeding
   Level of certainty: low
5. When there is strict adherence to standard infection control practices, the risk of infection due to IACS is low.
   Level of certainty: moderate
6. There is an increased risk of postoperative deep joint infection when IACS is administered within 3 months prior to that joint replacement surgery, especially if IACS is performed within 1 month of surgery.
   Level of certainty: moderate
7. There is a trend toward increased risk of postoperative deep joint infection when IACS is administered within 3 months prior to that joint replacement surgery.
   Level of certainty: low

Recommendations

1. Patients with diabetes mellitus should be advised to monitor blood glucose carefully postinjection for at least 48 hours, until blood glucose normalizes (possibly up to 7 days).
   Grade A
2. Monitoring of cortisol levels pre-IACS or post-IACS is not recommended routinely.
   Grade D
3. In the right clinical setting, adrenal crisis should be considered as a possible etiology in the hypotensive patient in the days or weeks following IACS.
   Level of certainty: low
4. For patients on chronic stable warfarin therapy with good control (no bleeding symptoms), anticoagulation therapy need not be withheld for IACS; patients on warfarin may be in therapeutic INR range.
   Grade A
5. Providers should adhere to standard infection control practices, including strict aseptic technique when performing IACS.
   Grade A
6. Avoid IACS within 3 months of planned total replacement of that joint, notably within 1 month of planned surgery.
   Grade D
7. Discuss with the surgeon the risks/benefits when considering IACS in a joint planned for replacement surgery within 3 months.
   Grade C

Dosing

Table 5 Minimum effective and commonly used doses of intra-articular, bursa, and tendon corticosteroid injections

Study	Joint/Bursa/Tendon	Steroid, dose	Indication
Minimum effective dose (based on dose-response studies)			
Onks *et al* Yoon *et al* Kim *et al*[81–83]	IACS, glenohumeral joint	TA, 20 mg	Glenohumeral arthritis; adhesive capsulitis
Hong *et al*[84]	SASDB	TA, 20 mg	Rotator cuff tear
Carroll *et al*[85]	SASDB	TA, 20 mg; MPA 20 mg	Shoulder pain
Popma *et al*[173]	Knee joint	TA, 40 mg	Knee osteoarthritis
Kosiyatrakul *et al*[203]	Trigger finger	TA, 20 mg	Trigger finger

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Commonly used doses			
Hanson *et al* Zhang *et al* Yiannakopoulos *et al*[32 89 90]	Long head of biceps	TA, 40 mg TA, 20 mg in patients with diabetes	Tendinitis of the long head of the biceps
Qian *et al* Krogh *et al* Bisset *et al* Coombes *et al* Gaujoux-Viala *et al* Assendelft *et al* Bisset *et al*[101–107]	Lateral epicondyle	TA, 20, 40, 80 mg MPA, 20, 40 mg Betamethasone, 6 mg Dexamethasone, 4 mg	Lateral epicondylosis
Stahl *et al*[113]	Medial epicondyle	MPA, 40 mg	Medial epicondylosis
Kim *et al*[116]	Olecranon bursa	TA, 40 mg	Olecranon bursitis
Lambert *et al* Park *et al* Jurgensmeier *et al* Qvistgaard *et al* Atchia *et al* Young *et al*[123 127–130 135]	Hip joint	TH, 40 mg TA, 40 mg MPA, 40 mg	Hip joint osteoarthritis
Migliorini *et al* Brinks *et al* Rompe *et al* Nissen *et al*[136 158–160]	Greater trochanteric bursa	MPA, 40 mg TA, 40 mg TH, 80 mg Prednisolone, 25 mg Betamethasone, 1 mL (5 mg/mL betamethasone dipropionate and 2 mg/mL betamethasone sodium phosphate)	Greater trochanteric bursitis
Mellor *et al* Mellor *et al*[165 166]	Gluteus medius/minimus tendon	TA, 40 mg Betamethasone, 5.7 mg (1 mL)	Gluteus medius/minimus tendinopathy
Wang *et al* Kroon *et al*[187 196]	Wrist joint	TA, 40 mg	Arthritis of joint
Nam *et al*[201]	Distal radioulnar joint	TA, 20 mg	Arthritis of joint
Wang *et al*[187]	Metacarpophalangeal joint	TA, 20 mg	Arthritis of joint
Wang *et al* Kroon *et al*[187 196]	Interphalangeal joint	TA, 20 mg TH, 4–6 mg	Arthritis of joint
Kroon *et al* Meenagh *et al*[196 198]	Carpometacarpal joint	TA, 10 mg, 20 mg, 40 mg Betamethasone, 6 mg (1 mL), 3 mg (0.5 mL) TH, 5 mg	Arthritis of joint
Huisstede *et al*[204]	Tendon, thumb side of wrist	TA, 10 mg, 20 mg MPA, 40 mg Betamethasone, 6 mg (1 mL)	De Quervain's (radial styloid) tenosynovitis
David *et al* Whittaker *et al* Hansen *et al* Babatunde *et al* Abdelghani *et al*[206 207 209–211]	Plantar fascia	TA, 20, 40, 80 mg* MPA, 20, 40, 80 mg Betamethasone, 6 mg Dexamethasone, 4, 8 mg	Plantar fasciitis

*Plantar fasciitis, TA, and MPA: no dose-response studies but a 20 mg dose shown to be effective.

IACS, intra-articular corticosteroid injection; MPA, methylprednisolone acetate; SASDB, subacromial subdeltoid bursa; TA, triamcinolone acetonide; TH, triamcinolone hexacetonide.

High points

- There is little evidence to guide the selection of one corticosteroid over another.
- A dose of 20 mg triamcinolone is as effective as 40 mg TA for shoulder IACS.
- The most used dose for hip IACS was 40 mg TA or MPA.
- Triamcinolone 40 mg is as effective as 80 mg for knee IACS.
- Minimum interval of 2–3 weeks between injections, up to 3 months.
- The series of injections can be stopped when there is complete or acceptable pain relief or when the relief has plateaued
- Overall, IACS results in short- term (4 weeks to 3 months) pain relief.

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Thank you!