

If not due to a serious cause, treat with Vaseline or saline gel and topical antibiotics for any infection. Refer if malignancy is suspected, otherwise treat symptomatically.

Nasal fractures^{2,9}

Fractures of the nose can occur in isolation or combined with fractures of the maxilla or zygomatic arch. They may result in nasal bridge bruising, swelling, non-alignment and epistaxis. Always check for a compound fracture or head injury and, if present, leave alone and refer. If the patient is seen immediately (such as on a sports field) with a straightforward lateral displacement, reduction may be attempted ‘on the spot’ with digital manipulation before distortion from soft tissue swelling. This involves simply using the fingers to push laterally on the outside of the nose towards the injured side.²

Tips:

- X-rays are generally unhelpful unless excluding other facial skeletal injuries and for legal reasons.
- If a deformity is present, refer the patient within 7 days, ideally from days 3–5.
- Skin lacerations, i.e. compound fracture, usually require early specialist assessment.
- The optimal time to reduce a fractured nose is about 10 days after injury. There is a window period of 2–3 weeks before the fracture unites.
- Closed reduction under local or general anaesthetic is the preferred treatment.
- Open reduction is more suitable for bilateral fractures with significant septal deviation, bilateral fractures with major dislocations or fractures of the cartilaginous pyramid.

Refer:

- septal haematoma
- uncontrolled epistaxis
- recurrent epistaxis
- concern about cosmetic alignment
- cribriform plate fracture
- CSF rhinorrhoea

Haematoma of nasal septum

Septal haematoma following injury to the nose can cause total nasal obstruction. It is easily diagnosed as a marked swelling on both sides of the septum when inspected through the nose

(see FIG. 48.4).



FIGURE 48.4 Inferior view of nasal cavity showing bilateral swelling of septal haematoma

It results from haemorrhage between the two sheets of mucoperiosteum covering the septum. It may be associated with a fracture of the nasal septum.

Note: This is a most serious problem as it can develop into a septal abscess. The infection can pass readily to the orbit or the cavernous sinus through thrombosing veins and may prove fatal, especially in children. Otherwise it may lead to necrosis of the nasal septal cartilage followed by collapse and nasal deformity.

Treatment

- Remove blood clot through an incision, under local anaesthetic.
- Prescribe systemic (oral) antibiotics (e.g. penicillin or erythromycin).
- Treat as a compound fracture if X-ray reveals a fracture.
- ENT specialist advice as necessary.

Stuffy, running nose in adults

For simple post-URTI rhinitis, blow the nose hard into disposable paper tissue or a handkerchief until clear, instil a nasal decongestant for 2–3 days (if desired) and also have steam inhalations with Friar's Balsam or menthol preparations.

Rhinorrhoea

This can be normal or abnormal. There is a ‘nasal cycle’ in which there is nasal congestion and decongestion that alternates from side to side and leads to rhinorrhoea. Other causes of normal discharge include vasomotor reactions to external environmental stimuli, such as cold wind and irritants, and postnasal drip (2 L of mucus pass down the back of the nose each day). The diagnostic model for rhinorrhoea is presented in [TABLE 48.5](#).

Table 48.5 Nasal drip (rhinorrhoea) diagnostic strategy model

Probability diagnosis

URTI (esp. common cold)

Rhinitis (acute infective, allergic, vasomotor)

Vasomotor stimulation (e.g. cold wind, smoke, irritants)

Sinusitis → postnasal drip

Senile rhinorrhoea

Serious disorders not to be missed

Vascular:

- cluster headache

Infection:

- chronic infective granulomas, e.g. TB

Cancer/tumours:

- malignancy (nasal fossa, sinus, nasopharynx)

Other:

- CSF rhinorrhoea (post-head injury)
- Wegener granulomatosis

Pitfalls (often missed)

Nasal foreign body, e.g. in toddlers

Trauma ± blood

Adenoid hypertrophy

Illicit drugs (e.g. cocaine, opioids, esp. heroin)

Inhaled irritant gases or vapour

Rarities:

- choanal atresia
- barotrauma

Seven masquerades checklist

Drugs: topical OTC → rhinitis medicamentosa; narcotics

Hyperthyroidism

⌚ Senile rhinorrhoea

This is a common, distressing problem in the elderly, caused by failure of the vasomotor control of the mucosa. It may be associated with a deviated septum and dryness of the mucosa. There are few physical signs apart from the nasal drip. The treatment is to keep the nasal passages lubricated with an oil-based preparation, e.g. insufflation with an oily mixture (a sesame oil-based preparation, e.g. Nozoil, is suitable) or petroleum jelly. Topical decongestants cause serious side effects in the elderly.

⌚ CSF rhinorrhoea

Following head injury, clear dripping fluid (+ve for glucose or beta-2 transferrin, a more specific test) may indicate a fracture of the roof of the ethmoid. A useful test is the ‘halo’ or double-ring test, where a bloodstained drop is placed on tissue paper and shows separation of blood and straw-coloured CSF. Refer for assessment, although spontaneous healing can occur.

⌚ Neoplasia

Malignant nasal disease, which is uncommon, may cause nasal discharge that may be clear at first, becoming thick and offensive. Malignancy should be suspected in the presence of blood. The growth may be in the nasal fossa, sinus or nasopharynx.

Benign tumours include papilloma, fibroma, osteoma, juvenile fibroangioma of puberty and nasal polyps. Fibroangiomas occur exclusively in males between the ages of 9 and 24. Patients present with unilateral nasal obstruction and recurrent epistaxis.

Malignant tumours include nasopharyngeal carcinoma, with the maxillary sinus being the most common site. Squamous cell carcinoma is the most common, followed by adenocarcinoma melanoma and lymphoma. Malignant or non-healing granuloma, sometimes called ‘midline granuloma’, is a slowly progressing ulceration of the face starting in the region of the nose.⁴ It may represent a form of T cell malignant lymphoma, which responds to radiotherapy. The differential diagnosis is Wegener granulomatosis (see CHAPTER 21). Diagnosis is by CT scan and biopsy. Treatment of nasopharyngeal and sinonasal carcinoma depends on the site, size and histology, but usually involves a combination of surgery and postoperative radiotherapy.

Nasal disorders in children

Nasal problems, especially nasal discharge (rhinorrhoea), are very common in children Page 585 but the pattern of presentation is usually different from that of adults. Sinusitis is uncommon in children under the age of 10, and allergic nasal polyps are relatively rare. If a child presents with polyps, consider the possibility of cystic fibrosis or neoplasia. Rhinitis, epistaxis and nasal foreign bodies are common.

Abnormal causes

- Adenoid hypertrophy causing postnasal space obstruction
- Foreign body in nose—usually unilateral discharge
- Allergic rhinitis
- Unilateral choanal atresia
- Sinusitis (possible but rare)
- Tumour (also rare—consider fibroangioma)

Diagnosis may be enhanced by spraying with a vasoconstricting agent and getting the child to blow the nose. A tumour, foreign body or polyp may become visible.

Choanal atresia

Acute bilateral nasal obstruction may occur in newborns with congenital bilateral choanal atresia. This leads to anterior nasal discharge and immediate acute respiratory distress, temporarily relieved by crying. Immediate recognition and relief are essential. A finger in the corner of the mouth while finding an oral (Guedel) airway can be life-saving, as can passing a nasal probe down one nostril and perforating the membrane.

Sinusitis

Although rare, sinusitis can represent a serious emergency. Red flags requiring consideration include a sick child, pyrexia, rapid onset, unilateral and deteriorating airway obstruction.

Blocked nose and snoring

The above causes of nasal blockage may lead to snoring, mouth breathing, reduced sense of smell, dribbling and possibly obstructive sleep apnoea.

Nasal trauma and fractures¹¹

Areas of concern associated with nasal fractures, which are uncommon, are possible child abuse, open fracture, septal haematoma or abscess and eye or facial changes. If a fracture is

undisplaced, the treatment is pain relief, ice compresses and rest. If displaced, refer for closed reduction under general anaesthetic within 1–2 weeks (ideally at 10 days).¹¹ If associated epistaxis does not settle with pressure, temporary packing may be required.

Epistaxis

Epistaxis is usually intermittent anterior bleeding from Little area and may follow trauma including nose picking. Bleeding often occurs at night due to vascular vasodilatation. At first, try correction with simple measures (see earlier in chapter) such as pinching below the nasal septum for 5 minutes, supplemented by cold packs. Vaseline applied in the nose at night tends to prevent bleeding, while an antibiotic ointment twice daily for 7–10 days may help.

If problematic, refer for an ENT appointment.

Tip: Think of a bleeding disorder or a tumour, e.g. juvenile angiofibroma.

Snoring and obstructive sleep apnoea

Generally, these problems in children are almost always due to adenotonsillar hypertrophy and most cases are relieved by surgery; CPAP is rarely necessary. Sleep studies are performed to confirm clinical features and allay parental concerns. See [CHAPTER 60](#).

The snuffling infant

Snuffling in infants is usually caused by rhinitis due to an intercurrent viral infection. The presence of yellow or green mucus should not usually be a cause for concern.

Treatment

Reassure the parents.

- Paracetamol mixture or drops for significant discomfort.
- Get the parents to perform nasal toilet with a salt solution (1 teaspoon of salt dissolved in some boiled water); using a cotton bud, gently clear out nasal secretions every 2 waking hours.
- Once the nose is clean, saline nose drops or spray (e.g. Narium nasal mist) can be instilled.
- Stronger decongestant preparations are not advised unless the obstruction is causing a significant feeding problem, when they can be used for up to 4–5 days.

Foreign bodies in the nose

The golden rule is ‘a child with unilateral nasal discharge has a foreign body (FB) until [Page 586](#) proved otherwise’. Such foreign bodies usually consist of beads, pebbles, peas, pieces of rubber, plastic and paper or other small objects handled by the child. A rhinolith may develop in time on

the foreign body. In adults, foreign bodies are often rhinoliths, which are sometimes calcium deposits on pieces of gauze or other material that has been used to pack the nose.

Removal of foreign bodies

Removal of FBs from the nose in children is a relatively urgent procedure because of the risks of aspiration. A disc/button battery such as a hearing aid battery in the nose is a medical emergency requiring urgent removal under anaesthetic.¹¹

The nose should be examined using a nasal speculum under good illumination. The tip of the nose should be raised and pressed with the tip of a thumb. At first, spray a topical decongestant into the nose and see if the child can blow it out after waiting 10 minutes. Do not attempt to remove FBs from the nose by grasping with ‘ordinary forceps’.

Methods of removal

1. Spray with decongestant, wait 10 minutes, then ask the child to blow out the FB.
2. It is best to pass an instrument behind the FB and pull or lever it forward.
 - Examples of instruments are:
 - a Eustachian catheter
 - a probe to roll out the FB
 - a bent hairpin
 - a bent paperclip
3. Snaring the FB

This is the appropriate method for soft, irregular FBs such as paper, foam rubber and cotton wool that are clearly visible. Examples of instruments are:

- a foreign-body remover
 - crocodile forceps
 - fine nasal forceps
4. Glue on a stick
- Apply SuperGlue to the plastic end of a swab stick. Within seconds, apply it to the FB (avoid the mucosa), wait a minute and then gently extract the FB.
5. Rubber catheter suction technique

The only equipment required is a straight rubber catheter (large type) and perhaps a suction pump. This method involves cutting the end of the catheter at right angles, smearing the rim of the cut end with petroleum jelly and applying this end to the FB, then providing suction. Oral suction may be applied for a recently placed or ‘clean’ object, but gentle pump suction, if available, is preferred.

5. Irritation of the nose

Some practitioners sprinkle white pepper into the nose to induce sneezing. It risks inhalation.

7. The ‘kiss and blow’ technique

This mouth-to-mouth method is used for a cooperative child with a firm, round foreign body such as a bead impacted in the anterior nares. It is best to supervise the child’s mother to perform the technique, but the practitioner or practice nurse can perform it.

Method

- Use a nasal decongestant spray.
- After 20 minutes lay the child on an examination couch with a pillow under the head.
- Obstruct the normal nostril with a finger from the side.
- Place the mouth over the child’s mouth, blowing into it until a slight resistance is felt (this indicates that the glottis is closed).
- Then blow hard with a high-velocity puff to cause the FB to ‘pop out’.

To encourage cooperation with the technique, the child can be asked to give mother (or other) a ‘kiss’. More than one attempt may be needed, but it is usually very successful and avoids the necessity for a general anaesthetic.

Patient education resources

Hand-out sheets from *Murtagh’s Patient Education* 8th edition:

- Hay fever
- Nasal polyps
- Nosebleed
- Nose: stuffy, running nose
- Sinusitis

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49 Nausea and vomiting

Nausea, retching and hypersalivation frequently precede the act of vomiting, which is a highly integrated sequence of involuntary visceral and somatic motor events.

HARRISON'S PRINCIPLES OF INTERNAL MEDICINE, 1994

Vomiting or emesis is a rather dramatic event with a diverse number of causes. It is usually preceded by nausea.

Glossary of terms

Haematemesis Vomiting of blood. It is presented in [CHAPTER 44](#).

Nausea The unpleasant sickly sensation that may or may not herald the onset of vomiting.

Regurgitation The effortless passage of gastric contents into the mouth in the absence of nausea and without diaphragmatic muscular contractions.

Retching An involuntary act with all the movements of vomiting without the expulsion of gastric contents because the cardiac orifice remains closed.

Rumination The effortless regurgitation of recently ingested food into the mouth, followed by rechewing and reswallowing or spitting out.¹

Vomiting The forceful expulsion of gastric contents through a relaxed upper oesophageal sphincter and out of the mouth.

The clinical approach

History

A careful history is essential with an emphasis on drug intake, possible psychogenic factors,

including self-induced emesis, weight loss, other GIT symptoms or symptoms suggestive of systemic disease.

Examination

If fever is present possible sources of infection (e.g. middle ear, meninges and urinary tract) should be checked.

A careful abdominal examination is appropriate in most instances and this includes urinalysis. Look particularly for scars indicating previous surgery. Look for a succussion splash—this indicates pyloric obstruction.

Key facts and checkpoints

- Nausea and vomiting have a wide range of potential causes emanating from every body system.
- The common cause of acute nausea and vomiting in most age groups is gastroenteritis.
- The most common causes of vomiting in children are infections—viral (especially) and bacterial—including otitis media and urinary infection.
- Drug and alcohol ingestion is a common cause of nausea and vomiting; thus, a drug history is vital in assessment.
- Vomiting is commonly associated with migraine and may be the only symptom of a variety of migraines. Children with cyclical vomiting syndrome may have a genetic association with migraine.
- The nature of the vomitus provides a clue:
 - feculent = intestinal obstruction
 - blood = bleeding from oesophagus, stomach or duodenum (mostly)
 - coffee grounds = bleeding from stomach or duodenum

A neurological examination needs to be considered, including ophthalmoscopy. Consider raised intracranial pressure.

No examination is complete without assessment of the patient's physical fitness, including the level of hydration, especially in infants and the very old. In these age groups the history may be difficult to obtain and the consequences of fluid loss are more complicated. Always be mindful of the possibility of pregnancy in the female patient. Look for acid dental erosion as a marker of

bulimia.

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Investigations

If necessary, these should consider the underlying cause and also biochemical abnormalities resulting from fluid and electrolyte loss.

The following need to be considered:

- pregnancy test (all females of child-bearing age)
- microscopy and culture of stools
- radiology of GIT
- endoscopy
- oesophageal motility studies
- neurological investigation for suspected intracranial pressure (e.g. CT scan, MRI)
- drug toxicity studies
- biochemistry
- cortisol/short synacthen test

Red flags for vomiting

- Marked pallor
- Signs of hypovolaemia
- Peritoneal signs
- Headache, stiff neck, confusion
- Distended tympanic abdomen

Diagnostic guidelines

- Surgical GIT causes are unlikely in the absence of abdominal pain.

- Vomiting without bile-stained vomitus = pyloric obstruction.
- Vomiting of bile = obstruction below duodenal ampulla.
- Vomiting of ingested food = oesophageal obstruction.
- Vomiting without nausea and possibly projectile = ↑ intracranial pressure.

A summary of the diagnostic strategy model is presented in [TABLE 49.1](#) .

Table 49.1 Vomiting in adults: diagnostic strategy model

Probability diagnosis

- Acute gastroenteritis/gastritis
- Drugs and toxins/alcohol intoxication
- Motion sickness
- Pregnancy
- Migraine/cyclical vomiting
- GORD

Serious disorders not to be missed

Bowel obstruction:

- severe constipation
- malignancy (e.g. oesophagus, stomach)

Severe infection:

- botulinum poisoning
- septicaemia
- meningitis/encephalitis
- infective endocarditis
- others (e.g. acute viral hepatitis)

Malignancy

Intracranial disorders: malignancy, cerebellar haemorrhage

Acute appendicitis

Acute pancreatitis/biliary colic

Acute myocardial infarction (e.g. painless)

Pitfalls (mainly adults)

Pregnancy (early)

Organ failure: liver, kidney (uraemia), heart, respiratory

Labyrinthine disorders: Ménière syndrome, labyrinthitis

Poisoning: food, chemicals, alcohol
Gut motility disorders: achalasia
Paralytic ileus
Acute glaucoma
Substance abuse, e.g. opioids, marijuana
Radiation therapy
Hypercalcaemia
Chronic idiopathic nausea and vomiting
Functional obstruction: diabetic gastroparesis, idiopathic gastroparesis

Seven masquerades checklist

Depression (possible)
Diabetes (ketoacidosis)
Drugs (various, e.g. cytotoxics, digoxin)
Anaemia
Thyroid and other endocrine disorders (Addison disease)
UTI

Is the patient trying to tell me something?

Possibly: extreme stress (e.g. panic attacks, anxiety).
Consider bulimia (self-induced vomiting) and functional (psychogenic).

Vomiting in infancy

Common causes in infants

- Feeding problems
- Food intolerance
- Physiological, e.g. posseting, simple reflux
- Gastro-oesophageal reflux
- Gastroenteritis
- Viral respiratory infections

Is the vomiting bile-stained?

- Green vomiting = urgent surgical referral for possible intestinal malrotation with volvulus (6 hours' leeway before gangrene of bowel).² Other causes: meconium ileus, small bowel/duodenal atresia.
- Non bile-stained vomitus (curdled milk): consider pyloric stenosis, GORD, feeding problems, concealed infection (e.g. UTI, meningitis). Both pyloric stenosis and GORD cause projectile vomiting.

Important warning signs in neonates

- Excessive drooling of frothy secretions from mouth
- Bile-stained vomitus—always abnormal
- Delayed passage of meconium (beyond 24 hours)
- Inguinal hernias

Refer to surgical emergencies in children ([CHAPTER 89](#)).

Specific conditions

Posseting

The effortless regurgitation of small quantities of undigested milk (breast or formula) after feeding is common in the first 1–4 months, and can continue up to the age of 18 months. In an otherwise healthy and thriving child with normal growth parameters, reassurance is appropriate.

Oesophageal atresia

- Vomiting occurs with the first feeding.
- There is excessive drooling of frothy secretions from the mouth.
- Pass a French gauge 10 catheter through the mouth to aid diagnosis.

Duodenal atresia

- Regurgitated feedings
- Bile-stained vomitus
- Abdominal distension
- Jaundice

Often associated with Down syndrome and cystic fibrosis.

Diagnosis: abdominal X-ray/upper GIT series (double bubble sign).

Treated with surgical repair.

Congenital hypertrophic pyloric stenosis

- Usually sudden onset 3rd–6th week
- Projectile vomitus
- Failure to thrive
- Male:female = 5:1
- Gastric peristalsis during test feeding (L → R):
 feel for pyloric tumour either during test feeding or immediately after vomiting (deep in right epigastrium)—see [FIGURE 49.1](#) ; once felt, further investigation is not necessary
- Biochemistry:
 metabolic alkalosis: sodium usually <130 mmol/L, chloride <100 mmol/L
- Special investigations (if necessary):
 barium meal (string sign)—concern about aspiration
 abdominal ultrasound
- Treatment:
 correct fluid and electrolyte deficiency (hypochloraemic alkalosis) before surgery
 appropriate fluid is N2 (half normal) saline with 5% dextrose
 surgical management (longitudinal pyloromyotomy)

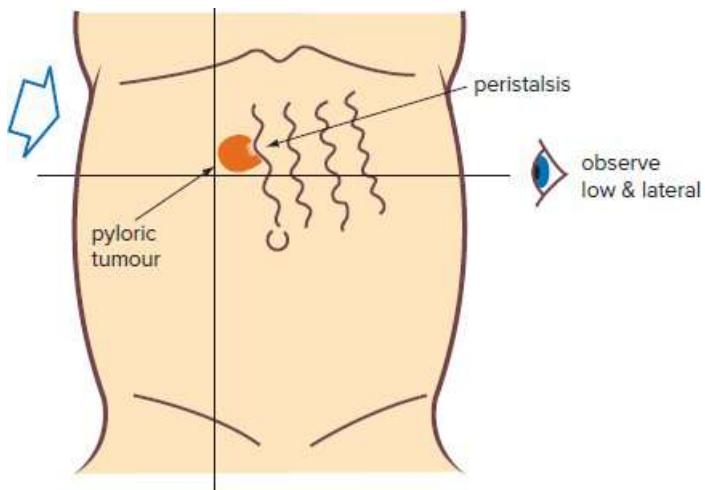


FIGURE 49.1 Signs of pyloric stenosis

Acute gastroenteritis

See [CHAPTER 34](#).

Intussusception

See [CHAPTER 24](#).

Vomiting in the older child

Common causes

- Acute gastroenteritis
- Acute viral infections
- Other common infections, e.g. otitis media
- Travel/motion sickness
- Migraine/cyclical vomiting
- Drugs and toxins, e.g. snake bite

Not to be missed

- Acute appendicitis/peritonitis

- Strangulated inguinal hernia
- Other surgical emergencies
- Raised intracranial pressure, e.g. head injury
- Serious infection, e.g. pneumonia, meningitis, sepsis
- Diabetes/ketoacidosis
- Haemolytic uraemic syndrome
- Eating disorders: binging/purging

Gastroparesis (adults)³

Gastroparesis (gastropathy) or severely delayed gastric emptying is a moderately common condition which is a cause of nausea and vomiting.

Causes include:

- diabetic gastroparesis (especially during periods of hyperglycaemia)
- postsurgical gastroparesis, e.g. vagotomy (complete or partial), fundoplication
- trauma
- idiopathic (de novo)

Less common causes include:

- connective tissue disorders (e.g. scleroderma)
- vasculitides
- myopathic disorders (e.g. muscular dystrophy)
- thyroid dysfunction
- hypokalaemia
- pancreatitis

Symptoms

- Upper abdominal discomfort/bloating
- Early satiety

- Nausea
- Postprandial vomiting (1–3 hours after meals)
- Abdominal pain

Diagnosis

- Endoscopy → significant gastric residue
- Barium swallow with follow through
- Nuclear medicine gastric emptying test (gastric retention of 60% after 2 hours is abnormal)

Special problems

- Malnutrition
- Dehydration

Management

- Advise patients to eat small, frequent meals, with careful chewing of food.
- Avoid large pieces of bread, especially doughy bread (encourage toasting).
- Avoid fat, especially French fries, raw fruit and vegetables.
- Refer those with diabetes to a dietitian for advice.

Medications^{4,5}

domperidone 10–20 mg (o) tds, 15–30 minutes before meals

or

metoclopramide 5–10 mg (o) tds, 30 minutes before meals

or

erythromycin (has prokinetic properties) 125 mg (o) tds, 15 minutes before meals (rapidly develops tolerance)

Consider cisapride 10 mg (o) tds before meals (with caution).

Other measures

- Injection of botulinum toxin into the pylorus

- Gastric pacing with internally implanted neurostimulators⁶

Functional nausea and vomiting^{7,8}

The Rome III classification of functional nausea and vomiting includes three disorders:⁹

- cyclical vomiting syndrome
- chronic idiopathic nausea
- functional vomiting

⌚ Cyclical vomiting syndrome⁷

Features:

- severe, unexplained vomiting or nausea occurring at varying intervals in a healthy person
- at least 3 or more limited episodes in previous year
- lasts hours to days
- most common in children (mean age 5 years)
- ± severe abdominal pain, photophobia, headache
- regarded as a migraine variant (possible family history of migraine headache)
- usually remits in adulthood—may persist
- treated with antimigraine therapy

⌚ Chronic idiopathic nausea and vomiting⁴

This term is applicable to people who experience chronic nausea with or without vomiting without an identifiable cause or precipitant. Gastric emptying is normal but cannot complete a meal. Nausea at least several times a week and, for vomiting, one or more episodes a week.

Note: Reflux disease and marijuana withdrawal can cause chronic nausea.

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Dietary modification with CBT is recommended. Anti-emetic or antidepressant medication can be considered.

Complications of vomiting

These include dehydration, metabolic alkalosis, hypokalaemia, aspiration, mucosal tear of

gastro-oesophageal junction, rupture of the oesophagus (Boerhaave syndrome).

Symptomatic relief of vomiting

The first-line management is to ensure that any fluid and electrolyte imbalance is corrected and that any underlying cause is identified and treated. Various anti-emetics can give symptomatic relief.

Note: Avoid the use of centrally acting dopamine antagonist drugs (DADS, e.g. metoclopramide and prochlorperazine) in children because of risk of extrapyramidal side effects (EPSE), usually acute dystonic reactions. Elderly also at risk. EPSE rare with domperidone because it does not cross the blood-brain barrier. Other DADS include haloperidol and droperidol (limited use).

Serotonin 5-HT₃ antagonists

These include ondansetron, granisetron, dolasetron, palonosetron and tropisetron and are effective at preventing chemotherapy- and radiotherapy-induced emesis when initiated prior to treatment. Dexamethasone enhances the effect of 5-HT₃ agents. Ondansetron can be used in children with gastroenteritis, preferably in wafer format.

Drug-induced nausea and vomiting⁴

metoclopramide 10 mg (o) or IM 8 hourly prn

For cytotoxic drugs (e.g. cisplatin) and radiotherapy:

metoclopramide 10 mg (o) or IM 1–2 hours prior to therapy then 8 hourly (if mild)

For severe cases:

ondansetron 8 mg (o) or IV prior to therapy then two doses 6 hourly

plus

dexamethasone 8 mg IV 30 minutes prior to therapy, then two doses 6 hourly

Note: Restrict ondansetron to 8 mg daily for those with hepatic dysfunction.

A list of some drugs that can cause nausea and vomiting is presented in TABLE 49.2 .

Table 49.2 Some drugs that can cause nausea and vomiting

Alcohol (including binge drinking)

Antibiotics (various) esp. erythromycin

Antidepressants (e.g. serotonin reuptake inhibitors)
Antidiabetic agents (e.g. metformin, GLP-1 analogues, acarbose)
Antihypertensives (e.g. CCBs, beta blockers)
Codeine
Colchicine
Corticosteroids
Cytotoxic agents and immunosuppressants
Digoxin
Iron preparations
Levodopa, other antiparkinsonism drugs (e.g. bromocriptine)
Nicotine and nicotine gum
NSAIDs (e.g. indomethacin, COX-2 inhibitors)
Opioids (e.g. morphine, codeine)
Oral contraceptives
Salicylates
Tamoxifen
Theophylline

Motion sickness

Refer to [CHAPTER 129](#) .

promethazine theoclate 25 mg (o) 60 minutes prior to travel

or

dimenhydrinate 50 mg (o) 60 minutes prior to travel

or

hyoscine 300–600 mcg (o) 30 minutes prior to travel

or

hyoscine 1.5 mg dermal disc: applied to dry hairless skin behind the ear 5–6 hours before travel (effective for 72 hours)⁴

For treatment: repeat oral presentations 4–6 hourly during trip (max. 4 doses in 24 hours).

Vestibular disturbances⁴

The phenothiazine derivatives are the most effective, while the dopamine D2-receptor antagonists are relatively ineffective. Refer to [CHAPTER 35](#).

prochlorperazine 5–10 mg (o) or 10 mg rectally, SC or IM 4 times daily prn

or

promethazine theoclate 25 mg (o) or IM 4 hourly prn (max. 100–150 mg per 24 hours)

[Page 593](#)

Note: Beware of tardive dyskinesia with prolonged use.

Gastroenteritis

For severe cases in adults:

metoclopramide 10 mg (o) or IM 8 hourly prn

Pregnancy

pyridoxine hydrochloride 25 mg (o) tds

plus

doxylamine 25 mg (o) nocte

if still ineffective add

metoclopramide 10 mg (o) tds or IM (if oral intolerance)

if response still unsatisfactory

ondansetron tablet or wafer 4–8 mg (o) bd to tds

Postoperative vomiting⁴

granisetron 1 mg IV (adult) pre-anaesthetic (to prevent postoperative N & V) and/or 1 mg postoperative

or

metoclopramide 10 mg IM or IV (slowly), 8 hourly prn

or

prochlorperazine 12.5 mg IM, 8 hourly prn

Chemotherapy and radiotherapy

ondansetron 4 mg (o or SL) bd

or

granisetron 2 mg (o) or IV

plus

dexamethasone 4 mg (o) daily

Practice tips

- Consider the possibility of anorexia nervosa and bulimia in adolescent females with a history of vomiting immediately after meals, especially after binge eating.
- If weight loss accompanies nausea and vomiting, consider GIT malignancy and obstruction as well as the above psychogenic conditions.
- Early-morning nausea and vomiting can be caused typically by alcohol, pregnancy, kidney failure and raised intracranial pressure.
- Intracranial space-occupying lesions can cause vomiting without associated anorexia or nausea.
- Gastroparesis commonly occurs in longstanding diabetes, following surgery or may be idiopathic. Intense nausea and anorexia are features.
- Anti-emetic drug therapy should not be used in infants and children with gastroenteritis.
- Anti-emetic treatment (see TABLE 49.3) must be tailored to the specific cause of the problem.
- Cannabinoids such as tetrahydrocannabinol, long advocated for cancer-associated emesis, appear to be effective in selected patients but are associated with central nervous system side effects in most patients.¹⁰
- The major complications of severe vomiting include trauma of the distal oesophagus, such as a Mallory–Weiss tear, and severe fluid and electrolyte disturbances.

Table 49.3 Anti-emetic medications in common use

Anti-emetic	Receptor antagonist	Route
Promethazine	H ₁ ; D ₂	O, IM, IV
Metoclopramide	D ₂ + 5-HT ₃	O, IV, IM
Prochlorperazine	D ₂ (central)	O, IM, PR
Domperidone	D ₂ (peripheral)	O
Droperidol	D ₂ (central)	IV
Haloperidol	D ₂ (central)	O, IM
Ondansetron	5-HT ₃	O, IV (slow)
Granisetron	5-HT ₃	O, IV (slow)

Important side effects: dystonia, dyskinesia, drowsiness, anti-cholinergic, hyperprolactinaemia

5-HT₃ = 5 hydroxytryptamine type 3; D₂ = dopamine D₂

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50 Neck lumps

There are approximately 800 lymph nodes in the body; no fewer than 300 of them lie in the neck and inflammation of these is exceedingly common.

MCNEIL LOVE, CO-EDITOR OF *BAILEY & LOVE'S SHORT PRACTICE OF SURGERY*, 1965

In the management of lumps in the neck it is important to distinguish between the various midline and lateral causes, especially cervical lymphadenopathy, which may be caused by occult malignancy, such as in the aerodigestive tract. With increasing ageing in the population the number of people presenting with a malignant neck lump is also increasing. The neck is divided into anterior and posterior triangles by the sternomastoid muscle and the anatomical areas are helpful in identifying the origin of the primary lesion (see FIG. 50.1).

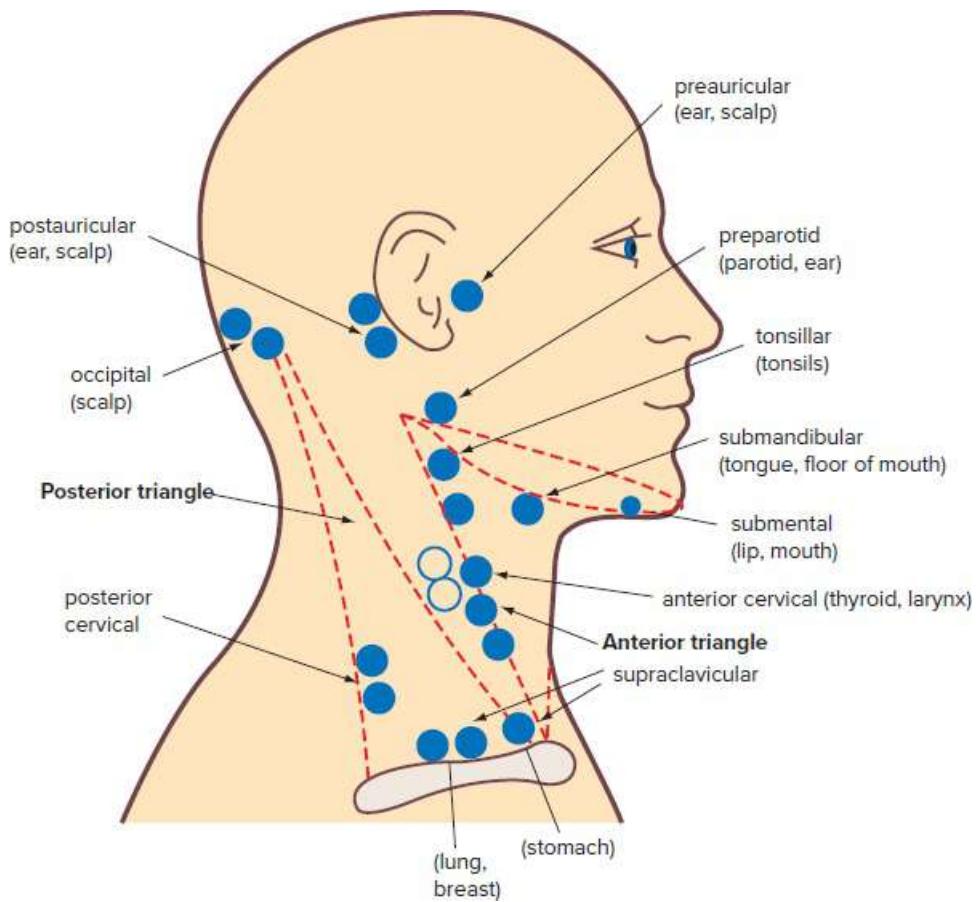


FIGURE 50.1 Lymph glands (site of the nodes) of the neck including common sources of adenopathy (excluding lymphomas)

Key facts and checkpoints

- Most neck lumps are reactive lymph nodes—to concurrent infection.
- Lymph nodes are normally palpable in children between 3 and 8 years of age; soft, mobile nodes up to 1 cm in diameter are commonly felt in the anterior and posterior triangle. A node >2 cm is considered to be enlarged. Some cervical glands are very prominent, especially tonsillar nodes.
- These prominent nodes often enlarge during intercurrent viral infection.
- Causes of neck swellings are lymph nodes (85%), goitres (8%), others (7%).¹
- Solitary nodules in the thyroid move on swallowing.
- Consider the possibility of tuberculosis, especially with exposure in endemic areas and in immunocompromised people.

- A knowledge of the areas drained by lymph nodes is important (see FIG. 50.1).
- Examination must extend beyond the neck for lymphadenopathy.
- To examine cervical nodes, slightly rotate head and palpate with palmar aspect of fingers.
- Palpate submental area with head slightly flexed.
- Biopsy of a complete lymph node is necessary to establish diagnosis for unknown or suspicious causes but do not consider it as the first step in diagnosis.²
- Other investigations are chest X-ray and FBE. Bone marrow biopsy or fine-needle aspiration of thyroid nodule or other masses may be considered. Fine-needle aspiration biopsy (FNAB), which is a relatively simple procedure, is the single most helpful investigation for diagnosing an unknown cause.³ If cytology reveals malignant squamous cells, the primary lesion may lie in the skin, lung, larynx, pharynx, ear or oesophagus.

A diagnostic approach

A summary of the diagnostic strategy model is presented in TABLE 50.1 .

Table 50.1 Neck lumps: diagnostic strategy model

Probability diagnosis

Lymphadenitis (reaction to local infection)

- acute: viral or bacterial
- chronic: MAIS (atypical tuberculosis), viral (e.g. EBM, rubella)

Prominent normal lymph nodes

Gothyre/thyroid cyst

Sebaceous cyst

Dermoid cyst

Lipoma

Sternomastoid tumour (neonates)

Serious disorders not to be missed

Vascular:

- carotid body tumour or aneurysm

Infection:

- 'collar stud' abscess (atypical TB)
- tuberculosis of cervical nodes (scrofula)
- HIV/AIDS of nodes
- actinomycosis

Cancer/tumour

- lymphoma (e.g. Hodgkin)
- leukaemia
- thyroid nodule (adenoma, cancer, colloid cyst)
- metastatic nodes—mainly regional (head and neck); or unknown primary
- salivary gland tumours

Pitfalls (often missed)

Parotitis; other salivary gland disorders

Thyroglossal cyst

Lymphatic malformation (children)

Cervical rib

Rarities:

- sarcoidosis
- cystic hygroma
- branchial cyst (child)
- laryngocele
- torticollis

The key components of the history, examination and investigations follow.

History

This depends on the age of the patient but should include in all ages a history of upper respiratory infection, lower respiratory infection, possible Epstein–Barr, HIV, cytomegalovirus and tuberculosis infection. Consider red flags such as weight loss, dysphagia, history of cancer and increasing size of the lump. Note any response to antibiotics given for a throat or upper airways infection.

Examination

- Careful palpation of lymph node areas and matching the site of any lymphadenopathy with a 'map' of areas drained by the nodes

- Examine the lump according to the classic rules of look, feel, move, measure, auscultate and transilluminate
- Palpate the midline anterior area for thyroid lumps and the submental area for submandibular swellings
- Note the consistency of the lump: soft, firm, rubbery or hard

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Investigations

- FBE
- ESR/CRP
- CXR
- TFTs (of thyroid swelling)
- Fine-needle aspiration biopsy of thyroid nodules
- Lymph node biopsy; consider culture for TB

Thyroid and primary tumours: imaging techniques (if necessary to assist diagnosis) include:

- ultrasound
- axial CT scan (esp. in fat necks)
- MRI scan (distinguishes a malignant swelling from scar tissue or oedema)
- tomogram of larynx (malignancy)
- barium swallow (pharyngeal pouch)
- sialogram
- carotid angiogram

Red flag pointers for neck lumps

- >40 years, esp. >70 years
- Nodes >2.5 cm
- Nodes >3–4 cm ?malignancy

- Tender mass
- Purple discolouration (collar-stud abscess)
- Single, gradually enlarging node
- Fixed to skin without punctum
- Associated dysphagia
- Hard midline thyroid lump
- Patient at risk of malignancy and HIV
- Exposure to tuberculosis

The 20:40 and 80:20 rules^{3,4}

- The age of the patient is a helpful guide, as causes of neck lumps can be roughly categorised by the '20:40 rule':
 - 0–20 years: congenital, inflammatory, lymphoma, tuberculosis
 - 20–40 years: inflammatory, salivary, thyroid, papillary thyroid cancer, lymphoma
 - >40 years: lymphoma, metastases, i.e. neck lumps are malignant until proven otherwise
- Most persisting neck lumps (80%) are benign in children while the reverse applies to adults.
- Imaging techniques that may assist diagnosis include axial CT scan (especially in fat necks), MRI scan (distinguishes a malignant swelling from scar tissue or oedema), tomogram of larynx (laryngocele or malignancy), barium swallow (pharyngeal pouch), sialogram and carotid angiogram.⁵

A basic suggested approach for the patient presenting with a neck lump is summarised in [FIGURE 50.2](#).

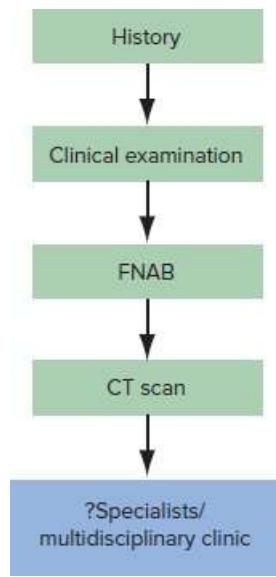


FIGURE 50.2 A basic approach for patients presenting with a neck lump⁴

Cervical lymphadenopathy

- There are many causes, varying from local infections to lymphoproliferative disorders.
- Most malignant nodes in the supraclavicular area have their primary tumour below the clavicle.
- Eighty-five per cent of malignant nodes in the anterior triangle have their primary tumour in the head and neck.²
- Always search for:
 - other nodes at distant sites
 - possible primary source of infections or neoplasia
 - hepatosplenomegaly
- Hodgkin lymphoma usually presents with rubbery, painless nodes in the neck.

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Consistency of enlarged nodes

Rules of thumb are:^{5,6}

- hard: secondary carcinoma
- rubbery: lymphoma

- soft: sarcoidosis or infection
- tender and multiple: infection

Causes of cervical lymph node enlargement (lateral cervical swelling)

Acute cervical lymphadenitis

- Acute viral lymphadenitis
- Acute bacterial lymphadenitis—coccal infection

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Chronic lymph node infection

- MAIS lymphadenitis (atypical tuberculosis)
- Tuberculosis
- Viral infection, e.g. EBM (see FIG. 50.3), rubella, cytomegalovirus, HIV
- *Toxoplasma gondii* infection
- Cat-scratch disease—*Bartonella henselae* infection



FIGURE 50.3 Cervical lymphadenopathy associated with Epstein–Barr mononucleosis

Neoplastic lymphadenopathy

- Lymphomas, esp. Hodgkin lymphoma
- Leukaemia

- Secondary to unknown primary

Metastatic

- Check mouth, pharynx, sinuses, larynx, scalp, oesophagus, stomach, breast, lungs, thyroid and skin. A working rule is upper neck—from skin to upper aerodigestive tract; lower neck—from below clavicles (e.g. lung, stomach, breast, colon).

- Examples:

occipital or pre-auricular—check scalp

submental—check mouth, tongue, teeth

submandibular—check floor of mouth

left supraclavicular (under sternomastoid)—consider stomach (Troisier sign)

deep anterior cervical—consider larynx, thyroid, oesophagus, lungs

Neck lumps not due to lymph node swelling⁷

Types and causes

Widespread

- Sebaceous cysts
- Lipomas

Midline

- Thyroid nodule (moves upon swallowing)
- Thyroglossal cysts (moves upwards on tongue protrusion)
- Dermoid cyst (beneath chin)

Anterior triangle

- Branchial cyst (in upper part):
 - usually adulthood (20–25 years)
- Carotid body tumour:
 - opposite thyroid cartilage

smooth and pulsatile
can be moved laterally but not vertically
usually 40–60 years
requires excision (with care)

- Carotid artery-tortuous or aneurysm
- Parotid tumour
- Lateral thyroid tumours

Posterior triangle

- Developmental remnants:
 - cystic hygroma
 - branchial sinuses and cysts
- Pancoast tumour (from apex lung)
- Cervical rib

Submandibular swellings

- Submandibular salivary gland
- Cervicofacial actinomycosis (lumpy jaw syndrome):
 - chronic granulomatosis infection due to Gram-positive *Actinomyces israelii*
 - forms a multilocular abscess (pus has ‘sulphur granules’), difficult to culture
 - infection follows dental extraction or poor dental hygiene, esp. severe caries
 - treat with high-dose penicillin G, 4 months

Sternomastoid tumour

Refer [CHAPTER 85](#).

Pharyngeal pouch

- A soft, squelchy, indefinite mass

- Base of left neck
- History of difficulty in swallowing

Thyroid nodule

The most likely cause of a solitary thyroid nodule is the dominant nodule in a multinodular goitre.

Other causes include a true solitary nodule—adenoma, follicular carcinoma or solitary carcinoma—and a colloid cyst. Malignancy must be excluded.

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Investigations

- Ultrasound
- FNAB (may resolve a cystic lesion)
- TFTs

Neck lumps in children

Eighty per cent of persisting neck lumps are benign while 20% are malignant. Benign lumps usually occur in the anterior triangle, while malignant lumps are more likely in the posterior triangle. The common midline lump in children is the thyroglossal cyst.³ Consider sternomastoid tumour (fibrosis) in infants (see [CHAPTER 85](#)).

Lymphadenopathy

- Most enlarged lymph nodes are either ‘normal’ or local infections (mainly viral), especially if <2 cm diameter, and not hard or fixed.
- Inflammatory nodes may be caused by infection in the tonsils, the teeth or other oral or nasopharyngeal cavities.
- They are of concern if supraclavicular node enlargement and fever <1 week.
- Suspicious nodes are >2.5 cm, with firmer consistency than normal and less mobility (investigate especially with biopsy).
- Consider bacterial infection with abscess formation in infants and children with large (2–4 cm) tender masses.

MAIS lymphadenitis^{4,8}

- Child usually 2–3 years of age
- Caused by *Mycobacterium avium-intracellulare-scrofulaceum* (MAIS) infection
- Produces chronic cervical lymphadenitis and collar stud abscesses
- A relatively common infection of cervical nodes, yet often unrecognised
- Painless swelling due to development of a cold abscess in healthy child
- Nodes enlarge over 4–6 weeks prior to erupting into a ‘cold’ abscess and the overlying skin has a purplish discolouration, which is an indication for surgical treatment
- Common sites are submandibular, tonsillar and pre-auricular nodes
- Invariably unilateral, confined to one lymph node group
- No pulmonary involvement
- Unresponsive to antimicrobials: treatment is by surgical excision of abscess and underlying lymph nodes

Acute bacterial lymphadenitis

- Usually coccal infections—*Staphylococcus, Streptococcus*
- Can progress to abscess formation (fluctuant): requires drainage

When to refer

- A persisting lump, depending on its location and size
- A lymph node or group of nodes that are abnormally enlarged and fail to respond to antibiotics

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51 Neck pain

We have all heard of the courtiers who mimicked the wry neck of Alexander the Great.

WILLIAM HEBERDEN (1710–1801)

Neck pain is a very common symptom in both sexes at all ages and although most pain is experienced in the posterior aspect of the neck, anterior neck pain can occur from causes that overlap between front and back. The main cause of neck pain is a disorder of the cervical spine, which usually manifests as neck pain but can refer pain to the head, shoulders and chest. Such pain usually originates from the facet (apophyseal) joints but can arise from other musculoskeletal structures, such as the intervertebral discs and the muscles or ligaments (see FIG. 51.1). The other major symptom is limited movement or stiffness.

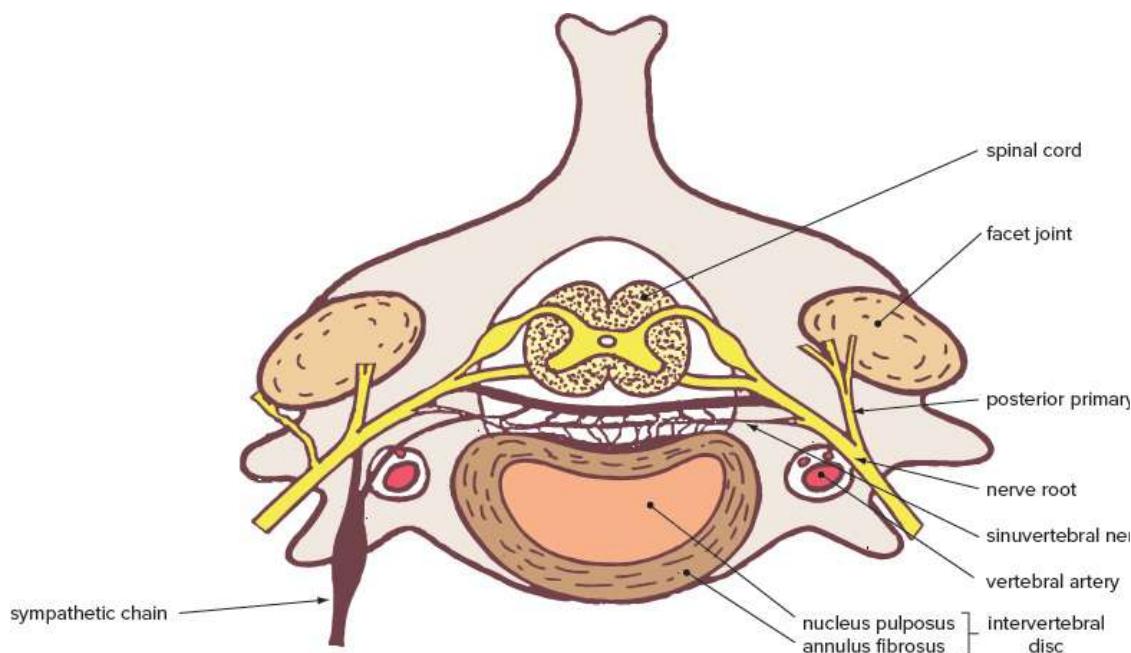


FIGURE 51.1 Transverse section illustrating the functional unit and nervous network of the cervical spine

General causes of neck pain are presented in TABLE 51.1 .

Table 51.1 Causes of neck pain (a pathological classification)

Musculoskeletal/structural

Joint dysfunction:

- apophyseal
- intervertebral disc

Muscular/ligamentous strains or sprains

Trauma:

- 'whiplash'
- fracture
- other disorders

Inflammation

Osteoarthritis*

Rheumatoid arthritis

Spondyloarthropathies (e.g. ankylosing spondylitis, psoriasis, reactive arthritis)

Polymyalgia rheumatica

Thyroiditis

Infective

Spinal:

- osteomyelitis
- tuberculosis
- herpes zoster

Extraspinal:

- epidural abscess
- cervical adenitis
- poliomyelitis
- tetanus

Extracervical:

- meningitis
- febrile states (e.g. meningism, malaria)

Degenerative

Spondylosis*

Metabolic

Paget disease

Calcium pyrophosphate crystal arthritis

Neoplasia

Benign

Malignant

Fibromyalgia syndrome

Psychogenic

Referred visceral

Heart:

- IHD
- pericarditis

Oesophagus

Lung cancer

Acute pancreatitis

Referred cranial

Haemorrhage (e.g. subarachnoid)

Tumour

Abscess

*Osteoarthritis, or spondylosis, is inflammatory and degenerative.

Key facts and checkpoints

- According to an Australian study, about 18% of people wake with some degree of neck pain and 4% experience neck pain or stiffness for all of the day.¹
- The commonest cause of neck pain is idiopathic dysfunction of the facet joints, also called 'non-specific', without a history of injury, with a prevalence peak at 45 years.
- Disorders of the intervertebral discs are common, especially in the lower cervical spine, and may cause unilateral pain, paraesthesia or anaesthesia in the arm.
- In a UK study, radiological cervical disc degeneration was present in 40% of males and 28% of females between 55 and 64 years.²
- Strains, sprains and fractures of the facet joints, especially after a 'whiplash' injury, are difficult to detect and are often overlooked as a cause of persistent neck pain.
- Cervical spondylosis is a disorder of ageing: radiological signs occur in 50% of people over the age of 50 and in 75% over the age of 65 years.³

- In cervical spondylosis, osteophytic projections may produce nerve root and spinal cord compression, resulting in radiculopathy and myelopathy respectively.
- Radiculopathy can be caused by a soft disc protrusion (usually unilateral), a hard, calcified lump and osteophytes (may be bilateral).
- Cervical disorders are aggravated by vibration (e.g. riding in a motor vehicle).
- Always determine the C2, C6 and C7 levels by finding the relevant spinous processes (easily palpable landmarks) prior to palpation.
- Palpation of the neck is the cornerstone of cervical management. Palpate gently—the more one presses, the less one feels.
- Most episodes of neck pain, including acute torticollis, are transient, lasting from about 2–10 days.
- A dull aching neck is typical of those aged 12–50 years.
- In one study, 70% of people with neck pain who sought medical attention had recovered or were recovering within 1 month.²
- More than 75% of the total cost of neck pain is attributable to indirect costs such as disability and work absenteeism.⁴ Yellow flags are important to address early on.
- Effective management of neck pain is based on the theoretical principle that stiff dysfunctional joints are painful and restoration of normal movement may be associated with resolution of pain.
- The optimal treatment for dysfunctional joints (without organic disease or radiculopathy) is active and passive mobilisation, especially exercising.

A diagnostic approach

A summary of the diagnostic strategy model is presented in TABLE 51.2 .

Table 51.2 Neck pain: diagnostic strategy model

Probability diagnosis

Vertebral dysfunction (non-specific neck pain)

Traumatic ‘strain’ or ‘sprain’

Cervical spondylosis

Serious disorders not to be missed

Cardiovascular:

- angina
- subarachnoid haemorrhage
- arterial dissection/leaking aortic aneurysm

Neoplasia:

- primary metastasis
- Pancoast tumour

Severe infections:

- osteomyelitis
- meningitis

Vertebral fractures or dislocation

Pitfalls (often missed)

Disc prolapse

Myelopathy

Cervical lymphadenitis

Fibromyalgia syndrome

Outlet compression syndrome (e.g. cervical rib)

Polymyalgia rheumatica

Ankylosing spondylitis

Rheumatoid arthritis

Oesophageal foreign bodies and tumours

Paget disease

Seven masquerades checklist

Depression

Thyroid disorder (thyroiditis)

Spinal dysfunction

Is the patient trying to tell me something?

Highly probable. Stress and adverse occupational factors relevant.

Probability diagnosis

The main causes of neck pain are vertebral dysfunction, especially of the facet joints, and traumatic strains or sprains affecting the musculoligamentous structures of the neck. The so-called myofascial syndrome is mainly a manifestation of dysfunction of the facet joints. Acute wry neck (torticollis), which is quite common, is yet another likely manifestation of apophyseal joint dysfunction. Spondylosis, known also as degenerative osteoarthritis and osteoarthritis, is

also a common cause, especially in the elderly patient.

Intervertebral disc disruption is also a relatively common phenomenon in the cervical spine, especially at the lower levels C5–6 and C6–7.⁵

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Serious disorders not to be missed

Conditions causing neck pain and stiffness may be a sign of meningitis or of cerebral haemorrhage, particularly subarachnoid haemorrhage, or of a cerebral tumour or retropharyngeal abscess.

Angina and myocardial infarction should be considered in anterior neck pain. Other visceral disorders can refer pain to the neck.

Arterial dissection of the internal carotid artery or vertebral artery should be kept in mind in patients presenting with acute neck pain, especially without musculoskeletal symptoms or signs.

Tumours are relatively rare in the cervical spine but metastases do occur and should be kept in mind, especially with persistent neck pain present day and night.

Metastasis to the spine occurs in 5–10% of those with systemic cancer, making it the second most common neurological complication of cancer. The cervical spine accounts for some 15% of spinal metastases.³

The commonest primary tumours are the breast, prostate or lung. Other primaries include the kidney, thyroid and melanoma.

Red flag pointers for neck pain

- History of major trauma; vertebral fracture
- Age >50 years with new symptoms
- Constant pain (day and night)
- Fever >38°C
- Anterior neck (throat) pain
- Pain at multiple sites
- History of cancer
- Unexplained weight loss
- Neurological deficit

- Spinal cord pathology
- Radicular pain in arm
- Rheumatoid arthritis and ankylosing spondylitis
- Down syndrome

Pitfalls

There are many pitfalls in the clinical assessment of causes of neck pain, many of them related to inflammation.

Rheumatoid arthritis is the prime severe inflammatory arthropathy that involves the neck but the neck can be affected by the seronegative spondyloarthropathies, particularly ankylosing spondylitis, psoriasis and the inflammatory bowel disorders.

While polymyalgia rheumatica affects mainly the shoulder girdle, pain in the lower neck, which is part of the symptom complex, is often overlooked. Diffuse neck pain in myofascial soft tissue with tender trigger areas is part of the uncommon but refractory fibromyalgia syndrome.

‘Yellow flags’ are predictive of chronicity and disability. These include:⁶

- a belief that spinal pain is potentially severely disabling
- social or financial problems
- history of alcohol or substance addiction
- reduced activity levels
- the presence of a compensation claim

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General pitfalls

- Failing to appreciate how often the benign problem of facet joint dysfunction occurs in the neck, causing pain and limited movement. This involves failure to appreciate the value of physical therapy, especially exercise programs, in alleviating the problem.
- Failing to adhere to the idiom: one disc—one nerve root. Involvement of more than one nerve root in the upper limb may mean a neoplastic disorder such as metastatic disease, lymphoma in the thoracic outlet and similar serious diseases.
- Missing the insidious onset of myelopathy, especially the spasticity component, caused by rheumatoid arthritis, osteophytic overgrowth or, rarely, a soft disc prolapse.

- Failing to actively address psychosocial barriers to recovery.

Seven masquerades checklist

Cervical spinal dysfunction is the obvious outstanding cause. Thyroiditis may cause neck pain, as in the extremely rare cases of acute specific infection in the thyroid (e.g. syphilis, pyogenic infections), which cause severe pain; non-specific thyroiditis (de Quervain thyroiditis) produces painful swelling with dysphagia. The association between depression and neck pain is well documented.

Psychogenic considerations

The neck is one of the commonest areas for psychological fixation following injury. This may involve perpetuation or exaggeration of pain because of factors such as anxiety and depression, conversion reaction and secondary gain.

The psychological sequelae that can follow a whiplash injury and chronic neck problems such as spondylosis serve as a reminder that the state of the patient's cervical spine can profoundly affect his or her life and that we should always be aware of the whole person. A feeling of depression is a very common sequel to such an injury and these patients demand our dutiful care and understanding.

The clinical approach

History

It is important to analyse the pain into its various components, especially the nature of its onset, its site and radiation, and associated features. The diurnal pattern of the pain will provide a lead to the diagnosis (refer to FIG. 28.3 : the patterns are similar to low back pain).

Key questions

- Can you point to exactly where in your neck you get the pain?
- Do you wake up with pain in the morning?
- Does the pain come on when you have to look up for a while?
- Do you have trouble reversing your car?
- Can you recall an injury to your head or neck such as hitting your head on an overhead bar?
- Does your neck grate or get stiff?
- Do you get headaches or feel dizzy?

- Is the pain present day and night?
- Do you get pain or pins and needles or numbness in your arms?
- Does the pain come on with activity?
- Does the pain wake you at night?
- Do you feel pain on both sides of your neck and over your shoulders?
- Do your hands or arms feel weak or clumsy?

Examination

It is appropriate to follow the traditional rule for examination of any joint or complex of joints: *look, feel, move, measure, test function, look elsewhere* and X-ray. Careful examination of the cervical spine is essential for the correct diagnosis and for specific treatment at the painful level.

Three objectives of the examination are to:

- reproduce the patient's symptoms
- identify the level of lesion or lesions
- determine the cause (if possible)

A neurological examination is essential if radicular pain is present, or weakness or other upper limb symptoms, including any pain or paraesthesia that extends below the elbow.

Inspection

The patient should be examined sitting on a couch, rather than on a chair. The body should be fully supported with the hands resting on the thighs. The following should be noted:

- willingness to move the head and neck
- level of the shoulders
- any lateral flexion
- contour of the neck from the side

In the patient with torticollis the head is held laterally flexed with, perhaps, slight rotation to one side—usually away from the painful side. Patients suffering from whiplash injury and severe spondylosis tend to hold the neck stiff and the head forward, and tend to turn the trunk rather than rotate the neck.

Palpation

For this vital component of the examination it is essential to know the surface anatomy of the neck so that the affected level can be determined.

Method

The patient lies prone on the examination couch with the forehead resting on the hands (palms up). The neck should be flexed forward and the shoulders relaxed.

1. Central digital palpation

Systematically palpate the first spinous processes of the cervical vertebrae.

- C2 (axis) is the first spinous process palpable beneath the occiput.
- C7 is the largest ‘fixed’ and most prominent process—situated at the base of the neck.
- C6 is also prominent but usually ‘disappears’ under the palpating finger with extension of the neck.
- The spinous processes of C3, C4 and C5 are difficult to palpate because of cervical lordosis but their level can be estimated (see FIG. 51.2).

Standing at the patient’s head, place opposed pulps of the thumbs on the spinous processes (starting at C2) and then move down the middle line to C7. Press firmly over each and with arms straight oscillate with moderate firmness three or four times to assess pain, stiffness or muscle spasm.

2. Lateral digital palpation

The facet joints lie in sequence (called the articular pillar) about 2 to 3 cm from the midline. Press with opposed thumbs against this pillar in a systematic manner on either side of the midline (top to base) to determine any painful area. Palpation should be extended to include the anterior neck, searching for evidence of lymphadenitis, muscle spasm, thyroid disorder and other problems.

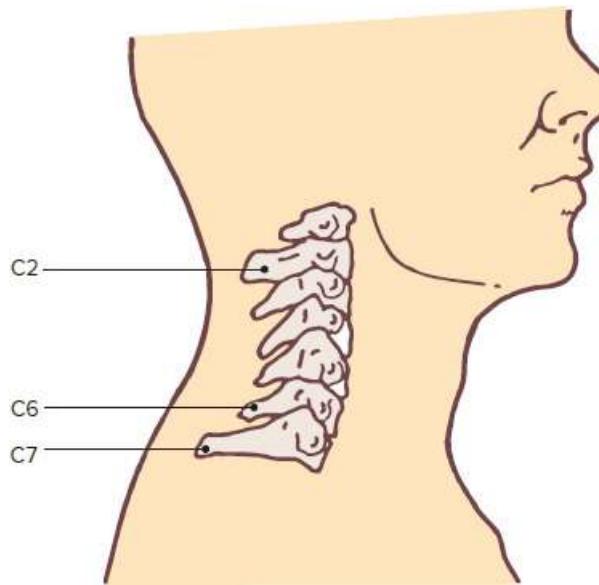


FIGURE 51.2 Relative sizes of spinous processes of the cervical spine

Movement

Active movements are observed with the patient sitting on the couch. The movements are as follows with normal range indicated:

- flexion—45°
- extension—50°
- lateral flexion (R and L)—45°
- rotation (R and L)—75°

Lhermitte sign is an electric shock-like pain throughout the body (especially in the legs) upon flexion of the neck. It indicates cervical pathology.

If there is a full range of pain-free movement, apply overpressure slowly at the end range and note any pain.

The range of movements can be plotted on a special grid called a direction of movement (DOM) diagram (see FIG. 51.3). This provides a ready reference for serial assessments.

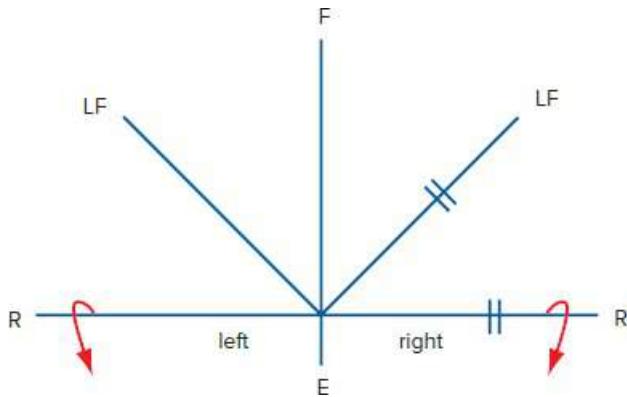


FIGURE 51.3 Direction of movement diagram to record movements of the neck. This record shows restricted and painful movements (indicated by II) in right lateral flexion and right rotation; the other movements are free.

Neurological examination

A neurological examination for nerve root lesions (C5 to T1) is indicated if the clinical assessment identifies the presence of neurological symptoms and signs such as pain, paraesthesia or anaesthesia in the arm. Nerve root pressure is indicated by:

- pain and paraesthesia along the distribution of the dermatome
- localised sensory loss
- reduced muscular power (weakness or fatigue or both)
- hyporeflexia (reduced amplitude or fatigue or both)

It is necessary to know the sensory distribution for each nerve root and the motor changes. This is summarised in [TABLE 51.3](#). The dermatomes are illustrated in [FIGURE 51.4](#).

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Table 51.3 Cervical nerve root syndromes

Nerve root	Sensory change	Muscle power	Power loss	Reflex
C5	Outer arm/medial scapula	Deltoid	Abduction arm	Biceps jerk (C5, 6)
C6	Outer forearm/thumb/index finger/dorsal forearm	Biceps	Elbow flexion Extension wrist	Biceps + brachioradialis (C5, 6)

C7	Hand/middle and ring fingers	Triceps	Elbow extension	Triceps (C7–8)
C8	Inner forearm/little finger, e.g. pad of finger	Long flexors finger, long extensors thumb	Grip	Fingers (C8)/flexors
T1	Inner arm	Interossei	Finger spread	

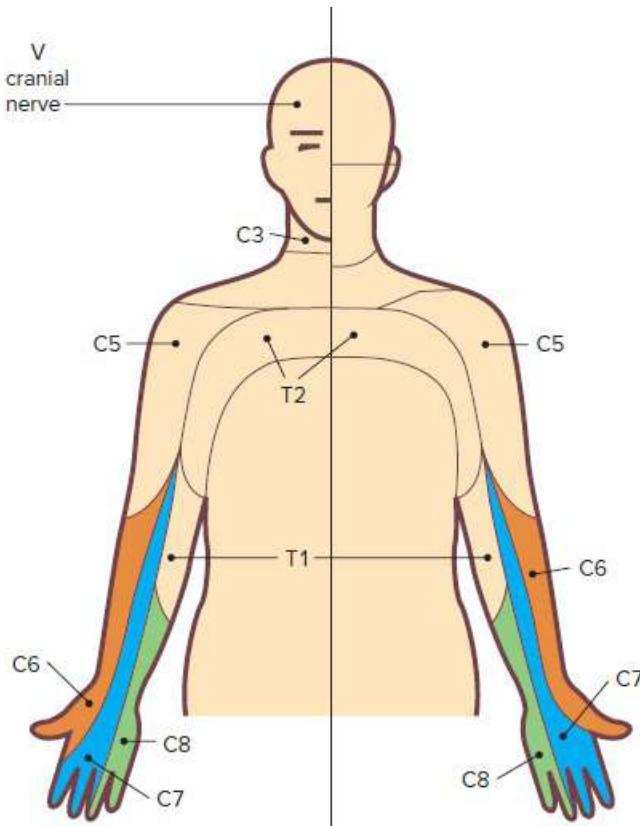


FIGURE 51.4 Dermatomes of the upper limb, head and neck

Investigations

Most non-traumatic, acute neck pain presenting in general practice does not require any imaging or blood test. Where red flags are present, investigations are directed to diagnosing the painful condition and determining if suspected or true organic disease is present in the spine. It is inappropriate to perform sophisticated investigations such as CT scans on most patients. Scanning should be reserved where surgery is contemplated and serious disease is suspected but not confirmed by plain X-ray.

Investigations to consider include:

- haemoglobin, film and WCC
- ESR/CRP
- rheumatoid factor
- radiology:
 - plain X-ray (not indicated in absence of red flags and major trauma)
 - CT scan (good for bone definition)
 - CT scan and myelogram (if cervical disc surgery contemplated)
 - radionucleide bone scan (for suspected metastatic disease)
 - MRI: the investigation of choice for cervical radiculopathy, myelopathy, suspected spinal infection and tumour

These should be selected conservatively. CT imaging has high radiation levels.

Neck pain in children

In children and adolescents, neck pain, often with stiffness, may be a manifestation of infection or inflammation of cervical lymph nodes, usually secondary to an infected throat—for example, tonsillitis or pharyngitis. However, it is vital to consider the possibility of meningitis. Sometimes a high fever associated with a systemic infection or pneumonia can cause meningism. In the presence of fever the rare possibility of poliomyelitis should be kept in mind. In both children and adults the presence of cerebral pathology, such as haemorrhage, abscess or tumour are uncommon possibilities.⁷ Acute torticollis is quite common in this age group and the neck may be involved in chronic juvenile arthritis.

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Neck pain in the elderly

In adults the outstanding causes are dysfunction of the joints and spondylosis, with the acute febrile causes encountered in children being rare. However, cerebral and meningeal disorders may cause pain and stiffness in the neck.⁷

Neck pain is common in rheumatoid arthritis and to a lesser extent the spondyloarthropathies. The painful, acute wry neck can affect all ages and is considered to be caused mainly by acute disorders of the apophyseal joints rather than disc prolapse. However, disc lesions do occur and can cause referred pain or radicular pain. In the elderly, radicular pain can also be caused by impingement of the nerve root in the intervertebral foramen that has become narrowed from the degenerative changes of longstanding spondylosis.

Problems with a higher probability with increasing age include:

- cervical spondylosis with radiculopathy or myelopathy
- atlantoaxial subluxation complicating rheumatoid arthritis
- polymyalgia rheumatica
- metastatic cancer
- Pancoast tumour of the lung
- angina and myocardial infarction
- pharyngeal and retropharyngeal infection and tumour

Clinical problems of cervical spinal origin

Pain originating from disorders of the cervical spine is usually, although not always, experienced in the neck. The patient may experience headache, or pain around the ear, face, arm, shoulder, upper anterior or posterior chest.⁷

Possible symptoms include:

- neck pain, stiffness
- headache, including migraine-like
- facial pain
- arm pain (referred or radicular)
- myelopathy (sensory and motor changes in arms and legs)
- ipsilateral sensory changes of scalp
- ear pain (peri-auricular)
- scapular pain
- anterior chest pain
- torticollis
- dizziness/vertigo

FIGURE 15.1 in CHAPTER 15 indicates typical directions of referred pain from the cervical spine. Pain in the arm (brachialgia) is common and tends to cover the shoulder and upper arm as

indicated.

Cervical dysfunction

Dysfunction of the 35 intervertebral joints that comprise the cervical spine complex is responsible for most cases of neck pain. The problem can occur at all ages and appears to be caused by disorder (including malalignment) of the many facet joints, which are pain-sensitive. Dysfunction of these joints, which may also be secondary to intervertebral disc disruption, initiates a reflex response of adjacent muscle spasm and myofascial tenderness.

Acute non-specific neck pain

Acute non-specific neck pain (ANP) is most commonly idiopathic or due to a whiplash accident. Serious causes are rare.⁸ Dysfunction can follow obvious trauma such as a blow to the head or a sharp jerk to the neck, but can be caused by repeated trivial trauma or activity such as painting a ceiling or gentle wrestling. People often wake up with severe neck pain and blame it on a ‘chill’ from a draught on the neck during the night. This is incorrect because it is usually caused by an unusual twist on the flexed neck for a long period during sleep.

Clinical features⁹

- Typical age range 12–50 years
- Dull ache (may be sharp) in neck
- May radiate to occiput, ear, face and temporal area (upper cervical)
- May radiate to shoulder region, especially suprascapular area (lower cervical)
- Rarely refers pain below the level of the shoulder
- Pain aggravated by activity, improved with rest
- Various degrees of stiffness
- Neck tends to lock with specific movements, usually rotation
- Localised unilateral tenderness over affected joints
- Variable restriction of movement but may be normal
- X-rays usually normal (or, more accurately: have the same rate of abnormalities as those without neck pain). Imaging is not indicated for the investigation of ANP in the absence of ‘red flags’ and a history of trauma⁸

Management

The aim of treatment is to reduce pain, maintain function and minimise the risk of chronicity.

- Provide appropriate reassurance, information and support.
- Give advice to the patient about rules of living, including the following:

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Do:

Stay active and resume normal activities.

Keep your neck upright in a vertical position for reading, typing and so on.

Keep a good posture—keep the chin tucked in.

Sleep on a low, firm pillow or a special conforming pillow.

Sleep with your painful side on the pillow.

Use heat and massage: massage your neck firmly three times a day using an analgesic ointment.

Don't:

Look up in a strained position for long periods.

Twist your head often towards the painful side (e.g. when reversing a car).

Lift or tug with your neck bent forwards.

Work, read or study with your neck bent for long periods.

Become too dependent on 'collars'.

Sleep on too many pillows.

- Monitor the patient's progress without overtreatment.

- Analgesia:⁹

first-line: paracetamol 1 g (o) qid or 1.33 g (o) 8 hourly, or an NSAID

consider tricyclic antidepressant for night pain or resistant pain, e.g. amitriptyline or nortriptyline

- Prescribe an exercise program as early as possible; start with gentle exercises and maintain them at home. Suitable exercises are shown in [FIGURE 51.5](#).
- Refer to an appropriate therapist for cervical mobilisation for persisting pain. Mobilisation combined with exercises can be an effective treatment. Occasionally, manipulation may help

with a stubborn ‘locked’ neck but should be left to an expert. If manipulation, which carries the rare but real risk of vertebral artery dissection and stroke, is to be performed, informed consent and an experienced therapist are required.¹⁰

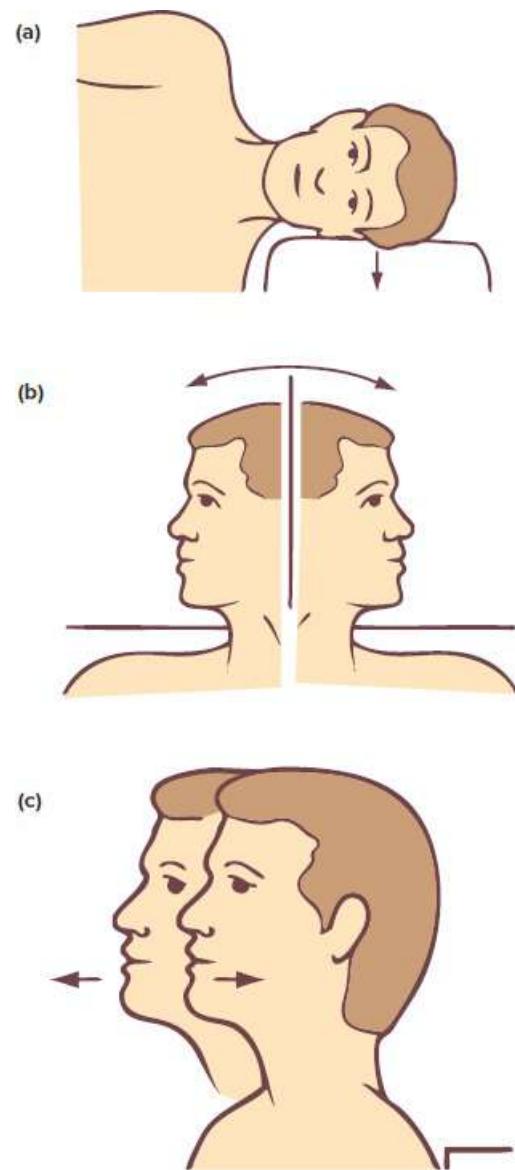


FIGURE 51.5 Examples of exercises for the neck: **(a)** resisted side bending, **(b)** rotation, **(c)** chin retraction

Approximately 40% of patients recover fully from acute idiopathic ANP, about 30% continue to have mild symptoms, while 30% continue to have moderate or severe symptoms.⁸

Evidence of benefit (in summary)⁸

- Staying active: resuming normal activities
- Exercises
- Combined cervical passive mobilisation/exercises
- Pulsed electromagnetic therapy (up to 12 weeks)

Chronic non-specific pain (lasting more than 3 months)⁹

Continue normal activities, exercises and effective analgesics as for ANP.

None of the additional treatment modalities have consistent supportive evidence. However, consider the following:

- a course of antidepressants
- TENS, especially when drugs are not tolerated
- hydrotherapy/thermography
- acupuncture (may provide short-term relief)
- corticosteroid facet injections (ideally under image intensification)
- facet joint denervation with percutaneous radiofrequency (if nerve block provides relief)
- multidisciplinary rehabilitation program

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Cervical spondylosis⁹

Cervical spondylosis following disc degeneration and apophyseal joint degeneration is far more common than lumbar spondylosis and mainly involves the C5–6 and C6–7 segments. The consequence is narrowing of the intervertebral foramen with the nerve roots of C6 and C7 being at risk of compression.

Cervical spondylosis is generally a chronic problem but it may be asymptomatic. In some patients the pain may lessen with age, while stiffness increases.

Clinical features

- Dull, aching suboccipital neck pain (see FIG. 51.6)
- Stiffness
- Worse in morning on arising and lifting head

- Improves with gentle activity and warmth (e.g. warm showers)
- Deteriorates with heavy activity (e.g. working under car, painting ceiling)
- Usually unilateral pain—may be bilateral
- Pain may be referred to head, arms and scapulae
- May wake patient at night with paraesthesia in arms
- C6 nerve root most commonly involved
- Acute attacks on chronic background
- Aggravated by flexion (reading) and extension
- Associated vertigo or unsteadiness
- Restricted tender movements, especially rotation/lateral flexion
- Joints tender to palpation
- X-ray changes invariable

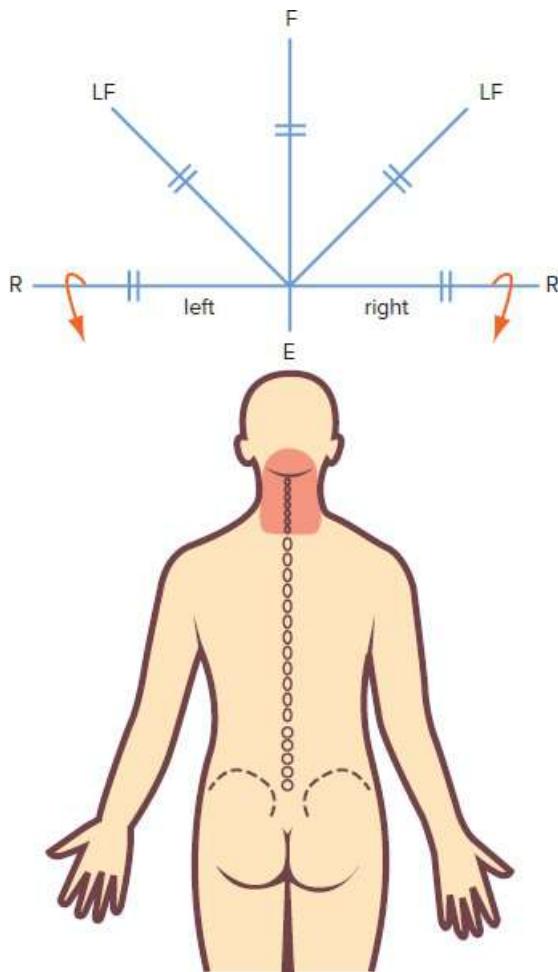


FIGURE 51.6 Cervical spondylosis: typical pain distribution with direction of movement diagram indicating painful and restricted movements

Treatment

- Provide appropriate reassurance, information and support.
- Refer for physiotherapy, including warm hydrotherapy.
- Use regular mild analgesics (e.g. paracetamol).
- Use NSAIDs: a trial for 2 weeks and then review.
- Prescribe gentle mobilising exercises as early as possible.
- Give passive mobilising techniques.
- Outline general rules to live by, including advice regarding sleeping and pillows, and day-to-day activities.

Complications

- Radiculopathy (unilateral or bilateral)
- Myelopathy—pressure on spinal cord
- Spinal canal stenosis

⌚ Acute torticollis

Torticollis (acute wry neck) means a lateral deformity of the neck. This is usually a transient self-limiting acutely painful disorder with associated muscle spasm of variable intensity.

Clinical features

- Age of patient between 12 and 30 years
- Patient usually awakes with the problem
- Pain usually confined to neck but may radiate
- Deformity of lateral flexion and slight flexion/rotation
- Deformity usually away from the painful side
- Loss of extension
- Mid-cervical spine (C2–3, C3–4, C4–5)
- Any segment between C2 and C7 can cause torticollis
- Usually no neurological symptoms or signs

The exact cause of this condition is uncertain, but both an acute disc lesion and apophyseal joint lesion are implicated, with the latter the more likely cause. Acute torticollis is usually a transient and self-limiting condition that can recover within 48 hours. Sometimes it can last for about a week. Encourage heat massage and early mobility. Avoid cervical collars. Management by mobilisation and muscle energy therapy is very effective.

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Muscle energy therapy

This therapy relies on the basic physiological principle that the contracting and stretching of muscles leads to automatic relaxation of agonist and antagonist muscles.^{11,12} Lateral flexion or rotation or a combination of movements can be used, but treatment in rotation is preferred. The direction of contraction can be away from the painful side (preferred) or towards the painful side, whichever is most comfortable for the patient.

Method

1. Explain the method to the patient, with reassurance that it is not painful.
2. Rotate the patient's head passively and gently towards the painful side to the limit of pain (the motion barrier).
3. Place your hand against the head on the side opposite the painful one. The other (free) hand can be used to steady the painful level—usually C3–4.
4. Request the patient to push the head (in rotation) as firmly as possible against the resistance of your hand. The patient should therefore be producing a strong isometric contraction of the neck in rotation away from the painful side (see FIG. 51.7A). Your counterforce (towards the painful side) should be firm and moderate (never forceful) and should not 'break' through the patient's resistance.
5. After 5–10 seconds (average 7 seconds) ask the patient to relax; then passively stretch the neck gently towards the patient's painful side (see FIG. 51.7B).
6. The patient will now be able to turn the head a little further towards the painful side.
7. This sequence is repeated at the new improved motion barrier. Repeat three to five times until the full range of movement returns.
8. Ask the patient to return the following day for treatment, although the neck may be almost normal.

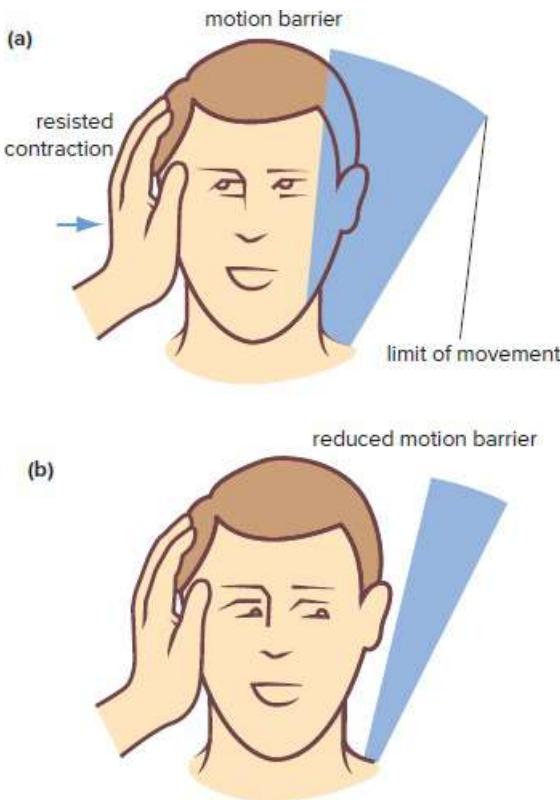


FIGURE 51.7 Muscle energy therapy for acute torticollis: **(a)** isometric contraction phase for problem on the left side, **(b)** relaxation phase towards the affected (left) side

The patient can be taught self-treatment at home using this method.

⌚ Acceleration hyperextension (whiplash) injury

Patients with the whiplash syndrome, preferably referred to as an acceleration hyperextension injury, typically present with varying degrees of pain-related loss of mobility of the cervical spine, headache and emotional disturbance in the form of anxiety and depression. The problem can vary from mild temporary disability to a severe and protracted course.

The injury occurs as a consequence of hyperextension of the neck followed by recoil hyperflexion, typically following a rear-end collision between motor vehicles. There is a reversal of the sequence of these movements in a head-on collision. In addition to hyperextension, there is prolongation or anterior stretching plus longitudinal extension of the neck.¹⁰ It can also occur with other vehicle accidents and in contact sports such as football.

Whiplash causes injury to soft tissue structures, including muscle, nerve roots, the cervical sympathetic chain, ligaments, apophyseal joints and their synovial capsules and intervertebral

discs. Damage to the apophyseal joints appears to be severe, with possible microfractures (not detectable on plain X-ray) and long-term dysfunction.

Pain and stiffness of the neck are the most common symptoms. The pain is usually experienced in the neck and upper shoulders but may radiate to the suboccipital region, the interscapular region and down the arms. The stiffness felt initially in the anterior neck muscles shifts to the posterior neck.

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Headache is a common and disabling symptom that may persist for many months. It is typically occipital but can be referred to the temporal region and the eyes.

Nerve root pain can be caused by a traction injury of the cervical nerve roots or by inflammatory changes or direct pressure subsequent to herniation of a disc.

Paraesthesia of the ulnar border of the hand, nausea and dizziness are all relatively common symptoms.

Delayed symptoms are common. A patient may feel no pain until 24 (sometimes up to 96) hours later; most experience symptoms within 6 hours. Complications of whiplash are summarised in TABLE 51.4 .

Table 51.4 Complications of whiplash

- Referred pain (headache, arm pain)
- Visual problems
- Vertigo
- Dysphagia
- Depression
- Compensation neurosis
- Disc rupture increasing to nerve root pain
- Osteoarthritis becomes symptomatic

The Canadian guidelines (1995) for whiplash are:

- Grade I—neck pain, stiffness or tenderness
- Grade II—neck symptoms + musculoskeletal signs (e.g. decreased range of motion, point tenderness)
- Grade III—neck symptoms + neurological signs
- Grade IV—neck symptoms + fracture or dislocation

Management principles

The objective of treatment is to obtain a full range of free movement of the neck without pain by attending to both the physical and the psychological components of the problem. Other objectives include an early return to work and discouragement of unnecessary and excessive reliance on cervical collars and legal action.

A 2018 systematic review found that poor expectations of recovery, post-traumatic stress symptoms and passive coping are the most consistent prognostic factors of chronic neck pain and/or disability after any whiplash injury.¹³

Treatment

- Establish an appropriate empathy and instil patient confidence with a positive, professional approach. Discourage multiple therapists.
- Provide appropriate reassurance and patient education.
- Encourage normalisation of activities as soon as possible.
- Compare the problem with a sprained ankle, which is a similar injury.
- Inform that an emotional reaction of anger, frustration and temporary depression is common (lasts about 2 weeks). Offer psychotherapy, e.g. CBT for evidence of post-traumatic stress.
- X-ray is required for ‘red flags’.
- Prescribe rest only for grades II and III (max. 4 days).
- Use a cervical collar (limit to 2 days) for grades II and III. Provide collar and refer for grade IV.
- Use analgesics (e.g. paracetamol)—avoid narcotics.
- Use a trial of NSAIDs for 14 days (poor evidence).
- Use tranquillisers, mild—up to 2 weeks.
- Refer for physiotherapy.
- Provide neck exercises (as early as possible).
- Use heat and massage—‘spray and stretch’—or ice.
- Give passive mobilisation (not manipulation).¹¹

Recovery can take any time from 1–2 weeks up to about 3 months. A valuable reference is the *Quebec Task Force Classification of Grades of Whiplash Associated Disorders*. Available from:

⌚ Cervical disc disruption

Disruption of a cervical disc can result in several different syndromes.

1. Referred pain over a widespread area due to pressure on adjacent dura mater.
Note: A disc disruption is capable of referring pain over such a diffuse area (see FIG. 51.8) that the patient is sometimes diagnosed as functional (e.g. hysterical).
2. Nerve root or radicular pain (radiculopathy). The pain follows the dermatomal distribution of the nerve root in the arm.
3. Spinal cord compression (myelopathy).

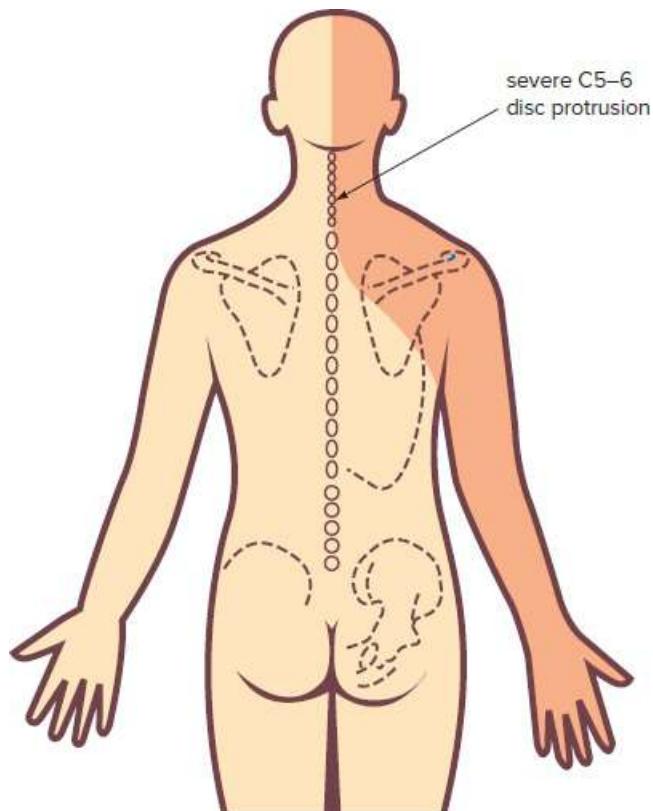


FIGURE 51.8 Zone of possible referred pain distribution caused by a cervical disc lesion on the right side

⌚ Radiculopathy

Apart from protrusion from an intervertebral disc, nerve root pressure or irritation causing arm pain can be caused by osteophytes associated with cervical spondylosis. Uncommon causes

include various tumours involving the vertebral segment, the meninges and nerves or their sheaths. The pain follows neurological patterns down the arm, being easier to localise with lower cervical roots, especially C6, C7 and C8.

- 1. The cervical roots exit above their respective vertebral bodies. For example, the C6 root exits between C5 and C6 so that a prolapse of C5–6 intervertebral disc or spondylosis of the C5–6 junction affects primarily the C6 root (see FIG. 51.4).
- 2. One disc—one nerve root is the rule.
- 3. Spondylosis and tumours tend to cause bilateral pain (i.e. more than one nerve root).

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Clinical features

- A sharp aching pain in the neck, radiating down one or both arms
- Onset of pain may be abrupt, often precipitated by a sudden neck movement on awakening
- Paraesthesia in the forearm and hand (in particular)—in 90% with proven disc prolapse¹¹
- Stiffness of neck with limitation of movement
- Nocturnal pain, waking patient during night
- Pain localised to upper trapezius and possible muscle spasm

Investigations

- Plain X-ray (AP, lateral extension and flexion, oblique views to visualise foramina); not required before 6–8 weeks unless red flags present; not useful for diagnosis or for surgery
- Plain CT scan
- CT scan and myelogram—excellent visualisation of structures but invasive
- MRI—excellent but expensive, sometimes difficult to distinguish soft disc from osteophytes
- Electromyography—may help delineate lesions requiring surgery

Treatment

Many people respond to conservative treatment, especially from a disc prolapse. It is basically a self-limiting disorder—about 10% remain severely disabled:¹²

- neck exercises
- consider semi-hard cervical collar, especially during the day

- analgesics (according to severity—see CHAPTER 28)
- consider a course of corticosteroids for severe neck radicular pain, e.g. prednisone 30 mg (o) daily for 5–10 days then taper off to 3 weeks (limited evidence)¹⁰
- tranquillisers, especially at night
- traction (with care)
- careful mobilisation including exercises (manipulation is contraindicated)

Cervical spondylitic myelopathy

Sometimes the presence of large or multiple osteophytes or in the presence of a narrowed spinal canal symptoms of spinal cord involvement may develop.^{14,15} The common cause is a hard mass of material projecting from the posterior aspect of the vertebral body to indent the spinal cord and possibly the nerve roots at the exit foramina. This resultant spinal cord compression may result in several different clinical presentations, notably myelopathy in particular, but also central cord and anterior cord syndrome. A full neurological assessment is necessary. Urgently refer patients for neurosurgical assessment.

Clinical features

- Older people, typically men >50 years
- Insidious onset—symptoms over 1–2 years
- Numbness and tingling in fingers
- Leg stiffness
- Gait disturbance
- Numb, clumsy hands, especially with a high cervical lesion
- Signs of UMN: spastic weakness, increased tone and hyper-reflexia (arms > legs) ± Page 611
clonus
- Neurological deficit, which predicts the level with reasonable accuracy
- Bowel and bladder function usually spared

Note: LMN signs occur at the level of the lesion, and UMN signs and sensory changes occur below this level.

Causes

- Cervical spondylosis
- Atlantoaxial subluxation: rheumatoid arthritis, Down syndrome
- Primary spinal cord tumours (e.g. meningiomas)
- Metastasis to cervical spine → epidural spinal cord compression

Investigations

- MRI scan
- CT scan with myelogram (most accurate)

Central cord syndrome^{15,16,17}

This rather bizarre condition occurs classically in a person with a degenerative cervical spine following a hyperextension injury that causes osteophytes to compress the cord anteriorly and posteriorly simultaneously.

The maximum damage occurs in the central part of the cord, leading to sensory and motor changes in the upper limbs with relative sparing of the lower limbs due to the arrangements of the long tracts in the cord.

Fortunately, the prognosis is good, with most patients achieving a good neurological recovery.

Anterior cord syndrome¹⁷

Anterior cord syndrome occurs with hyperflexion injuries that produce ‘teardrop’ fractures of the vertebral bodies or extrusion of disc material. The syndrome can also be produced by comminuted vertebral body fractures.

It is characterised by complete motor loss and the loss of pain and temperature discrimination below the level of the injury, but deep touch, position, two-point discrimination and vibration sensation remain intact.

Because it is probably associated with obstruction of the anterior spinal artery, early surgical intervention to relieve pressure on the front of the cord may enhance recovery. Otherwise the prognosis for recovery is poor.

Down syndrome

One of the more sinister problems with trisomy 21 syndrome is hypoplasia of the odontoid process, leading to C1–2 subluxation and dislocation. If unrecognised in the early stages, sudden death can occur in these children. If suspected, flexion–extension lateral views of the cervical spine will highlight the developing instability and the need for early specialist opinion.

Rheumatoid arthritis^{9,18}

Involvement of the cervical spine is usually a late manifestation of rheumatoid arthritis (RA). It is important to be aware of the potentially lethal problem of C1–2 instability due to erosion of the major odontoid ligaments in the rheumatoid spine. These patients are especially vulnerable to disasters when under general anaesthesia and when involved in motor vehicle accidents. Early cervical fusion can prevent tragedies, especially with inappropriate procedures such as cervical manipulation. It is imperative to perform imaging of the cervical spine of all those with severe RA before major surgery to search for C1–2 instability. Lateral plain X-rays in flexion and extension may reveal increased distance in the atlanto–dens interval. This can be assessed further with MRI or CT scanning in a specialist clinic.

Treatment of spondylitic myelopathy

Conservative (may help up to 50%):²

- soft or semi-hard cervical collar
- physiotherapy for muscle weakness
- analgesics and/or NSAIDs

Surgery is indicated when the myelopathy interferes with daily activities. One procedure is the Cloward method, which is anterior decompression with discectomy and fusion. The aim of surgery is to halt deterioration.

When to refer

- Persisting radicular pain in an arm despite conservative treatment
- Evidence of involvement of more than one nerve root lesion in the arm
- Severe symptoms with motor weakness
- Evidence of myelopathy, such as weakness, numbness or clumsiness of the upper limbs
- Evidence, clinical or radiological, of cervical instability in post-accident victims, or people with Down syndrome or rheumatoid arthritis

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Practice tips

- ‘One disc—one nerve root’ is a working rule for the cervical spine.
- The patient should sit on the couch with the thighs fully supported for inspection

and movements of the neck.

- Be alert for patients with RA and Down syndrome who have cervical instability. Physical treatments such as cervical manipulation may easily cause quadriplegia.
- All acutely painful conditions of the cervical spine following trauma should be investigated with a careful neurological examination of the limbs, sphincter tone and reflexes. Plain film radiology is mandatory.
- In conscious patients, flexion and extension lateral cervical spinal plain films are useful for diagnosing instability of spinal segments with or without associated spinal fractures.
- The so-called whiplash syndrome is a diagnosis of exclusion of spinal fractures or severe ligamentous disruption causing instability, and even then, for medicolegal and psychological reasons, would best be termed a 'soft tissue injury of the cervical spine'.
- Most 'soft tissue cervical spine injuries' heal within 3 months with conservative treatment. If severe pain persists, follow-up investigations may be required.
- Dysfunction of the cervical spine is an underestimated cause of headache.
- Always consider dysfunction of the cervical spine as a possible cause of shoulder pain.
- Strains and fractures of the apophyseal joints, especially after a whiplash injury, are difficult to detect, and are often overlooked causes of neck and referred pain.

Patient education resources

Hand-out sheets from *Murtagh's Patient Education* 8th edition:

- Exercises for your neck
- Neck: painful neck
- Whiplash
- Wry neck (torticollis)

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52 Shoulder pain

Search for clues—difficulty reaching into the hip pocket to remove a wallet may indicate loss of function due to total rupture of the supraspinatus tendon, while a complete rotator-cuff tear may lead the patient to lift the affected limb to the clothes line and leave it suspended there by the hand while hanging out the laundry.

MICHAEL HAYES 1996

The painful shoulder is a relatively common and sometimes complex problem encountered in general practice. The diagnostic approach involves determining whether the disorder causing the pain arises from within the shoulder structures or from other sources such as the cervical spine (see FIG. 52.1), the acromioclavicular (AC) joint or diseased viscera, especially the heart, lungs and sub-diaphragmatic structures.

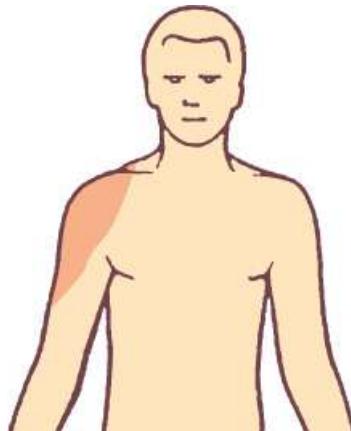


FIGURE 52.1 Typical pain zone arising from disorders of the shoulder joint and the lower cervical spine (C5 level)

Note: The term tendinopathy or tendinosis is preferred to tendinitis since it has been shown that overuse tendon conditions generally have a non-inflammatory pathology.

Key facts and checkpoints

- Virtually all shoulder structures are innervated by the fifth cervical vertebra (C5) nerve root. Pain present in the distribution of the C5 nerve can arise from the:
 - cervical spine
 - upper roots of brachial plexus
 - acromioclavicular joint
 - glenohumeral joint
 - rotator cuff tendons, especially supraspinatus
 - biceps tendon
 - soft tissue (e.g. polymyalgia rheumatica)
 - viscera, especially those innervated by the phrenic nerve (C3, C4, C5)
- The visceral diseases causing a painful shoulder include cardiac disorders, such as angina and pericarditis; lung diseases, especially Pancoast tumour; mediastinal disorders; and diaphragmatic irritation, as from intra-abdominal bleeding or a subphrenic abscess.
- A careful history should generally indicate whether the neck or the shoulder is responsible for the pain.
- By the age of 50, about 25% of people have some wear and tear of the rotator cuff, making it more injury-prone.¹
- Disorders of the rotator cuff are common, especially supraspinatus tendinopathy. The most effective tests to diagnose these problems are the resisted movement tests.¹
- Injections of local anaesthetic and long-acting corticosteroid produce excellent results for inflammatory disorders around the shoulder joint, especially for supraspinatus tendinopathy. They are simple to perform and do not require ultrasound guidance.
- The diagnosis is usually made on the history and examination. Blood tests are usually not necessary and imaging has a limited place and value.²

Functional anatomy of the shoulder

A working knowledge of the anatomical features of the shoulder is essential for understanding the various disorders causing pain or dysfunction of the shoulder. Apart from the

AC joint (ACJ) there are two most significant functional joints—the glenohumeral (the primary joint) and the subacromial complex (the secondary joint) (see FIG. 52.2). The glenohumeral joint is a ball and socket joint enveloped by a loose capsule. It is prone to injury from traumatic forces and develops osteoarthritis more often than appreciated. Two other relevant functional joints are the scapulothoracic and sternoclavicular joints.

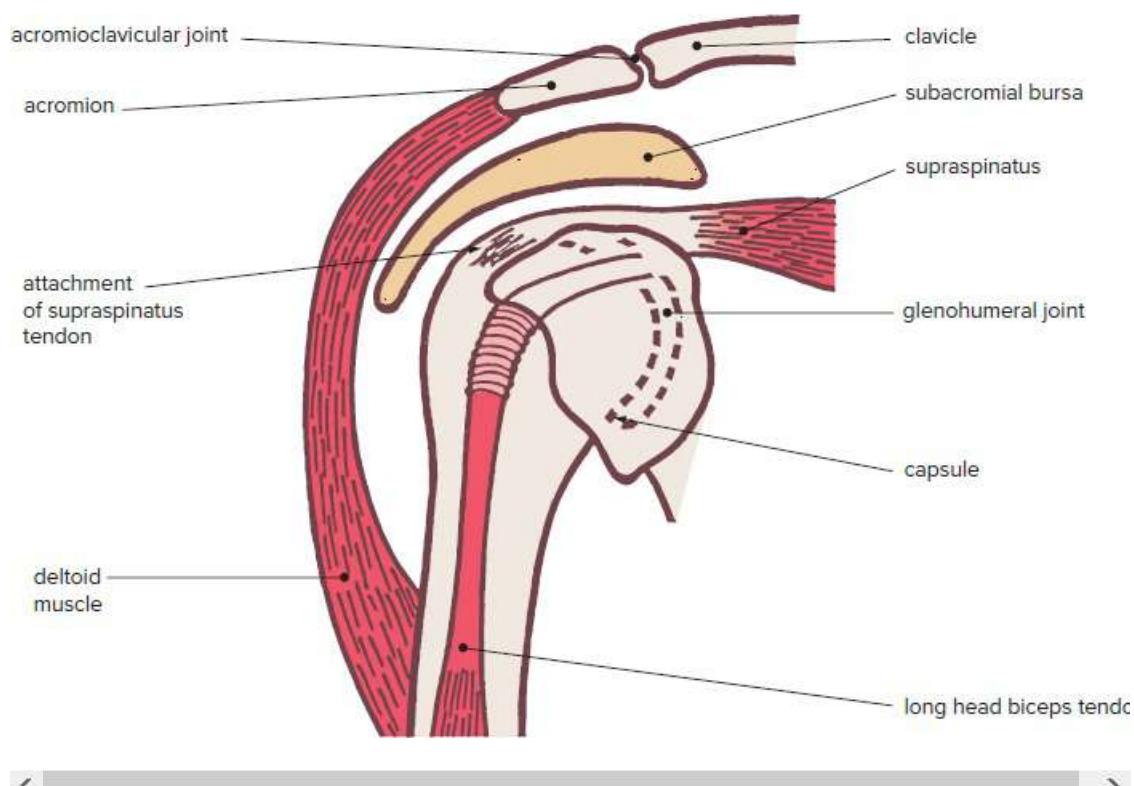


FIGURE 52.2 The basic anatomical structures of the shoulder joint

The clinically important perihumeral space lies above the glenohumeral joint (GHJ) between the head of the humerus and an arch formed by the bony acromion, the thick coracoacromial ligament and the coracoid process. This relatively tight compartment houses the subacromial bursa and the rotator cuff, particularly the vulnerable supraspinatus tendon.³ Excessive friction and pinching in this space render these structures prone to injury.

There is a critical zone of relative ischaemia that appears to affect the rotator cuff about 1 cm medial to the attachment of the supraspinatus tendon,⁴ and this area is compromised during adduction and abduction of the arm due to pressure on the rotator cuff tendons from the head of the humerus. The so-called ‘impingement interval’ is the space between the undersurface of the acromion and the superior aspect of the humeral head. This space is normally narrow (6–14 mm), especially when the arm is abducted.

Such factors are largely responsible for the many rotator cuff syndromes, including subacromial bursitis and lesions of the supraspinatus tendon and also bicipital tendinopathy.

A diagnostic approach

A summary of the diagnostic strategy model is presented in TABLE 52.1 .

Table 52.1 Shoulder pain: diagnostic strategy model

Probability diagnosis

- Cervical spine dysfunction (referred pain)
- Rotator cuff tendinopathy ± a tear
- Adhesive capsulitis ('frozen shoulder')
- AC joint disorders
- Glenoid labral tears

Serious disorders not to be missed

Cardiovascular:

- angina
- myocardial infarction

Neoplasia:

- Pancoast tumour
- primary or secondary in humerus

Severe infections:

- septic arthritis (especially children)
- osteomyelitis

Axillary vein thrombosis

Rheumatoid arthritis

Intra-abdominal pathology, e.g. bleeding

Pitfalls (often missed)

Polymyalgia rheumatica

Cervical dysfunction

Gout/pseudogout (uncommon)

Osteoarthritis of acromioclavicular joint

Bicipital tendon lesions

Winged scapula—muscular fatigue pain

Seven masquerades checklist

Depression

Diabetes

Drugs

Thyroid disorder (rarely)

Spinal dysfunction

Is the patient trying to tell me something?

Shoulder is prone to (uncommonly) psychological fixation for secondary gains, depression and conversion reaction.

Probability diagnosis

The commonest causes of pain in the shoulder zone (see FIG. 52.1) are cervical disorders and periarthritis (i.e. soft tissue lesions involving the tendons around the glenohumeral joint). The outstanding periarthritic disorders are the rotator cuff disorders (most common) and adhesive capsulitis. The supraspinatus tendon is subjected to considerable friction and wear and tear, and prone to calcific tendinitis and an acute tear.

Serious disorders not to be missed

As usual it is important to exclude any malignancy or septic infection, be it septic arthritis or osteomyelitis. Lung cancer (Pancoast syndrome), myeloma and bony metastases should be kept in mind. For pain in the region of the left shoulder the possibility of myocardial ischaemia has to be considered. Referred pain to the right shoulder from myocardial ischaemia is rare, occurring about once for every 20 episodes of left shoulder referral.

Referred pain from the diaphragm and intra-abdominal disorders (e.g. biliary, perforated ulcer, splenic rupture) should be kept in mind.

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With an acute onset of painful capsulitis the possibility of rheumatoid arthritis (or even gout) is worth considering.

Pitfalls

The shoulder is notorious for diagnostic traps, especially for referred pain from visceral structures, but polymyalgia rheumatica is the real pitfall. A good rule is to consider it foremost in any older person (over 60) presenting with bilateral shoulder girdle pain that is worse in the morning.

Specific pitfalls include:

- misdiagnosing posterior dislocation of the shoulder joint
- misdiagnosing recurrent subluxation of the shoulder joint
- overlooking an avascular humeral head (post fracture)
- misdiagnosing rotator cuff tear or degeneration

Seven masquerades checklist

Of the seven primary masquerades, spinal dysfunction and depression are those most likely to be associated with shoulder pain. The degree to which cervical spondylosis is associated with shoulder pain is not always appreciated.

Remember that a patient's description of 'shoulder' pain may include anywhere from the lower border of the scapula to the lateral neck. Ask them to point.

Diabetes incurs a higher risk of adhesive capsulitis. Drugs are relevant as corticosteroids can cause avascular necrosis of the humeral head and anabolic steroids (weight-lifters) can cause osteolysis of the AC joint.

A summary of common shoulder conditions is presented in TABLE 52.2 .

Table 52.2 Common shoulder conditions⁵

Problem	Structure affected	Typical age group	Symptoms	Diagnostic pointers
Instability	Labrum/capsule	15–35	Dislocations	History of dislocation, apprehension sign
Stiffness	Capsule	40–60	Pain, night pain, loss of movement	Loss of external rotation
Impingement	Rotator cuff (fatigue)	30–60	Night pain, pain with overhead activities	Impingement signs
Rotator cuff tear	Rotator cuff, esp. supraspinatus	50 +	As above	Impingement signs, weakness external rotation, weakness supraspinatus
Capsulitis	GHJ capsule	50–60	Constant severe pain, stiffness	Loss of all movements
AC joint pain	ACJ cartilage	25–45	Localised AC joint pain	Paxinos sign
Arthritis	GHJ cartilage	70 +	Pain, loss of movement	Crepitus

The clinical approach

History

In analysing the pain pattern it is appropriate to keep the various causes of shoulder pain in mind (see TABLE 52.3). Many of these conditions, such as rheumatoid arthritis, osteoarthritis and gout, are relatively uncommon.

Table 52.3 Causes of shoulder pain (excluding trauma, fractures and dislocations)

Cervical:

- dysfunction
- spondylosis

Cervical radiculopathy

Polymyalgia rheumatica (bilateral)

Acromioclavicular joint:

- dysfunction
- osteoarthritis

Shoulder complex

Extracapsular:

- subacromial bursitis
- rotator cuff disorders:
 - supraspinatus tendinopathy
 - infraspinatus tendinopathy
 - subscapularis tendinopathy
- bicipital tendinopathy

Intracapsular (glenohumeral joint):

- adhesive capsulitis:
 - idiopathic
 - blunt trauma
 - diabetes
- rheumatoid inflammation:
 - rheumatoid arthritis
 - ankylosing spondylitis

psoriatic arthropathy

- osteoarthritis
- avascular necrosis
- septic arthritis

Winged scapula—muscular fatigue pain

Malignant disease:

- primary or secondary in humerus
- Pancoast (referred from lung)

Referred pain

Cardiac:

- ischaemic heart disease
- pericarditis

Gall bladder

Lung

- mediastinum, including oesophagus
- diaphragmatic irritation

Herpes zoster

A careful history should generally indicate whether the neck or the shoulder (or both) is responsible for the pain. Enquire about features of movement:

- stiffness and restriction
- excessive movement/instability
- weakness
- rough versus smooth

Red flag pointers for shoulder pain⁶

- Fever (septic arthritis, osteomyelitis)
- Skin redness or swelling
- History of trauma (dislocation, fracture, rotary cuff tear)
- History of inflammatory arthritis
- Past history cancer

- Motor or sensory loss in arm

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Key questions

- Did you have any injury, even very minor, before your pain started?
- Does the pain keep you awake at night?
- Do you have pain or stiffness in your neck?
- Do you have pain or restriction when clipping or handling your bra or touching your shoulder blades? (indicates painful internal rotation and a problem of capsular restriction or a disorder of the acromioclavicular joint)
- Do you have trouble combing or attending to your hair? (indicates problematic external rotation— infraspinatus—and also a disorder of the capsule, e.g. adhesive capsulitis)
- Is the pain worse when you wake in the morning? (indicates inflammation)
- Do you have aching in both your shoulders or around your hips?
- Do you get pain associated with sporting activity, including weight training, or with housework, dressing or other activities?
- Could you throw a ball underhand for 10–20 m and/or overhead for 20–25 m with your affected arm?
- Could you lift a full 2 L container (e.g. milk) to the level of your shoulder without bending your elbow (or to the top of your head)?
- Could you carry a 20–30 kg weight (e.g. full suitcase) by your side?
- Do NSAIDs give relief?

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Examination

The diagnosis is based on systematic examination of the cervical spine followed by examination of the shoulder joint. For details of examination of the cervical spine, refer to [CHAPTER 51](#) .

Examination of the shoulder^{3,6}

For the examination of the shoulder it is important to understand the functional anatomy of all important tendons. Follow rule: look, feel, move.

The tendon disorders are diagnosed by pain on resisted movement (see [TABLE 52.4](#)). A

knowledge of the anatomical attachments of the rotator cuff tendons to the head of the humerus (see FIG. 52.3) provides an understanding of the shoulder movements powered by these muscles.

Table 52.4 Tendon disorders: determining resisted movements

Painful resisted movement at shoulder	Affected tendon
1 Abduction	Supraspinatus
2 Internal rotation	Subscapularis
3 External rotation	Infraspinatus Teres minor*
	Biceps*
4 Adduction	Pectoralis major Latissimus dorsi*

*Lesser role

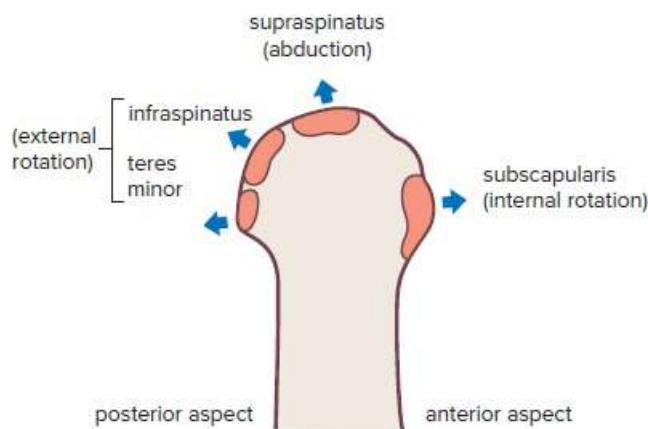


FIGURE 52.3 The attachments of the rotator cuff tendons to the head of the humerus

Source: Reproduced with permission from C Kenna and J Murtagh. *Back Pain and Spinal Manipulation*. Sydney: Butterworths, 1989

With tendon disorders (rotator cuff tendons or biceps) there is usually painful restriction of movement in one direction, but with capsulitis and subacromial bursitis there is usually restriction in most directions.

Inspection

Observe the shape and contour of the shoulder joints and compare both sides. Note the posture and the position of the neck and scapula. The position of the scapula provides considerable clinical information. Note any deformity, swelling or muscle wasting.

Palpation

Stand behind the patient and palpate significant structures such as the AC joint, the subacromial space, the supraspinatus tendon and the long head of biceps. The subacromial bursa is one area where it is possible to localise tenderness with inflammation. Feel also over the supraspinatus and infraspinatus muscles for muscle spasm and trigger points. The axilla should be palpated for lymphadenopathy.

Movements

The movements of the shoulder joint are complex and involve the scapulothoracic joint as well as the glenohumeral joint, with each joint accounting for about half the total range. Significant signs of a painful capsular pattern can be gained by determining the movements of flexion, abduction, external rotation and internal rotation.

For each movement, note:

- the range of movement
- any pain reproduction
- any trick movement by the patient
- scapulothoracic rotation

Movements should be tested bilaterally and simultaneously wherever possible.

Look for impingement, which is the sign of fleeting interruption of free movement by 'catching' of a tendon upon bone. Page 618

1 Active movements

- Flexion (anterior elevation) 180°
- Extension (posterior elevation) 50°

With the palm facing medially the patient moves the arm upwards through 180° to a vertical position above the head and then backwards through this plane.

- Abduction—180°
- Adduction—50° (from neutral position)

Abduction, which is initiated by the deltoid (first 15%), is possible only if the arm is fully

externally rotated. It is a key combined glenohumeral and scapulothoracic movement, which should reach 180°, and these components should be differentiated if the movement is limited. This is done by fixing the scapula with one hand, holding the scapula at its inferior angle and noting the degree of movement of each component (initial glenohumeral range 85–100°). Look for the presence of a painful arc, which occurs usually between 60° and 120° of abduction (see FIG. 52.4).

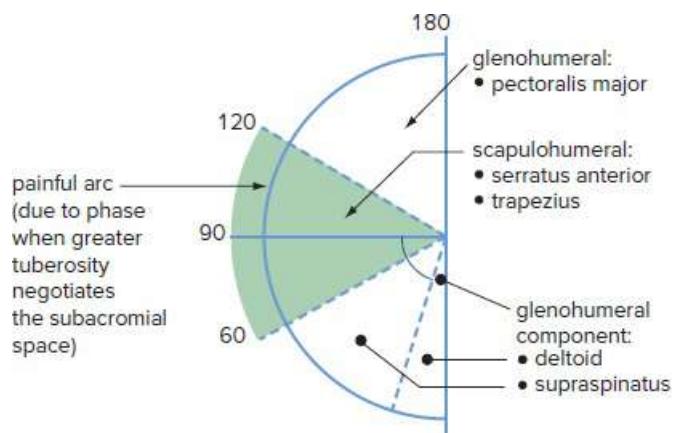


FIGURE 52.4 The painful arc syndrome

The commonest cause is supraspinatus tendinopathy. Other causes include infraspinatus tendinopathy and subacromial bursitis (milder degree).

- Internal rotation—90°
- External rotation—90°

These movements are tested with the arm by the side and the elbow flexed to 90° with the palm facing medially. The hand is carried outwards to test external rotation and inwards towards the abdomen for internal rotation.

2 Resisted movements³

Resisted movements (isometric contractions of a muscle) are important ways of testing capsulitis and for pinpointing tenderness of muscle insertions around the shoulder joint, and no examination of the shoulder is complete without them (see TABLE 52.4).

Abduction (supraspinatus test). With the arm abducted to no more than 15° the patient pushes the elbow away from the side while the examiner's hands resist and prevent the movement, holding for 5 seconds. Compare both sides and note any reproduction of the patient's pain.

A better and more specific test for supraspinatus impingement is testing resisted elevation in the 'emptying the can' position (90° of abduction, 30° horizontal flexion and full internal rotation).

Internal rotation (subscapularis test). The examiner stands behind the patient and grasps the

palmar surface of the patient's wrists (with the arm by the side and elbow at 90°). The patient attempts to move the forearm internally (medially) against resistance.

External rotation (infraspinatus test). With the examiner and patient adopting a similar position to that for internal rotation, the examiner grasps the dorsal surface of the forearm near the wrist and asks the patient to press outwards, using the forearm as a lever to produce external rotation. This test is also positive for a C5 nerve root lesion.

3 Special tests

Supraspinatus/infraspinatus rapid differentiation test. A quick test that helps to differentiate between a lesion of either of these tendons causing a painful arc syndrome is the 'thumbs up/thumbs down' abduction test. To test the supraspinatus, perform abduction with thumbs pointing upwards, and then with the thumbs pointing downwards to test the infraspinatus.

Long head of biceps test. The best test is opposed forward elevation of the arm with the elbow at right angles and forearm supinated (Speed test). A positive test is reproduction of pain in the bicipital groove. Another useful test is resisted supination at the wrist (Yergason test).

The brachial plexus tension test. This sequence of movements, devised by Elvey,⁷ tests the nerve roots and sheaths of the brachial plexus without implicating the cervical spine and the glenohumeral joint. The upper cervical roots of the plexus are sometimes injured in accidents, so this test is an effective differentiation test.

Impingement test for supraspinatus lesions. See later in this chapter.

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Investigations

Shoulder pain occasionally benefits from appropriate investigations, including:

- ESR (especially for polymyalgia rheumatica)/CRP
- rheumatoid factor and anti-CCP
- serum uric acid (acute pain)
- ECG (if IHD suspected)
- radiology:

X-ray of a specific part of the shoulder—AC joint, axillary view of glenohumeral joint (best view to show osteoarthritis)

X-ray of cervical spine and chest (if relevant)

radionuclide bone scan—to assess bone tumours

shoot-through axillary views (posterior dislocation)

high-resolution ultrasound—modern techniques make this an appropriate test to assess shoulder pain due to rotator cuff lesions, especially tears and capsulitis, especially if surgery is contemplated.

arthrogram of shoulder (beware of false negatives)

CT scan (limited use)

MRI—a useful imaging method but not routinely required except for the unstable joint

arthroscopy

Shoulder tip pain

Pain at the shoulder tip may be caused by local musculoskeletal trauma or inflammation or can be referred from blood or other irritants in the peritoneal cavity. Referred causes where the pain is unchanged by shoulder movement include:

- peptic ulceration
- diaphragmatic irritation (e.g. pneumonia)
- ruptured viscus (e.g. perforated ulcer)
- intraperitoneal bleeding (e.g. ruptured spleen)
- pneumothorax/pneumonia
- post laparoscopy (intraperitoneal gas)
- myocardial infarction/pericarditis
- ectopic pregnancy
- gall bladder disease

Shoulder pain in children

Shoulder pain in children is not a common presenting problem but the following require consideration:

- septic arthritis/osteomyelitis
- swimmer's shoulder (supraspinatus dysfunction)

Swimmer's shoulder

Although it occurs in adults, shoulder pain is the most common complaint in swimmers in the teenage years (over 12 years of age). American studies of college and national competition swimmers showed 40–60% had suffered significant pain.^{8,9}

Swimmer's shoulder, which is a form of rotator cuff tendinopathy, is considered to be associated with abnormal scapular positioning and cervicothoracic dysfunction and occurs in the supraspinatus tendon where an avascular zone is compressed by the greater tuberosity when the arm is abducted and relieved when adducted. Swimmers' shoulders are forced through thousands of revolutions each day, so the susceptible area tends to impinge on the coracoacromial arch, leading to the impingement syndrome, which can progress with continued stress and age.¹⁰

Management

- Early recognition is important.
- Discuss training program with coach.
- Consider alteration of technique.
- Application of ICE after each swim.
- Use NSAIDs.
- Avoid corticosteroid injections.
- Refer for physiotherapy for scapular stabilisation and cervicothoracic mobilisation.

Shoulder pain in adults

As a rule most of the shoulder problems increase with age. Special features in the elderly are:

- polymyalgia rheumatica (increased incidence with age)
- supraspinatus tears and persistent 'tendinitis'
- other rotator cuff disorders
- stiff shoulder due to adhesive capsulitis
- osteoarthritis of AC and glenohumeral joints
- cervical dysfunction with referred pain
- the avascular humeral head

Since the rotator cuff is prone to degeneration with age, there is a high incidence of rotator cuff tears in the elderly that are mostly asymptomatic.

The avascular humeral head

The humeral head may become avascular after major proximal humeral fractures. With [Page 620](#) experience, it is usually possible to predict the fractures at special risk. Early humeral head replacement with a prosthesis can lead to excellent pain relief and to a return of good function. Once the head has collapsed, there is secondary capsular contracture. Prosthetic replacement of the head is then rarely associated with an adequate return of joint movement. Thus, early referral of comminuted proximal humeral fractures for an expert opinion in all age groups is good practice. Early replacement can improve the functional outcome.¹¹

§ Rotator cuff tendinopathy⁶

Rotator cuff tendinopathy, also referred to as ‘the subacromial impingement syndrome’, is the commonest cause of shoulder pain. It can be associated with inflammation (tendinitis), a tear in a tendon (degeneration), calcification, amyloidosis or impingement under the acromion. It may involve one tendon, usually the supraspinatus, or more of the rotator cuff tendons. It is most frequently encountered in young people engaged in sport involving overhead activities and people over 50 years, in whom rotator cuff tears occur most often. The diagnosis can usually be made on the history and physical examination. A comparison between rotator cuff disease and capsulitis is presented in [TABLE 52.5](#) .

Table 52.5 Is it rotator cuff disease or capsulitis?^{11,12}

	Rotator cuff disease	Adhesive capsulitis
Pain	Often severe Night pain Inability to sleep on affected side	Often very severe Night pain Inability to sleep on affected side
Onset	Gradual or sudden Rapid onset suggests calcific tendinitis	Usually gradual
Movement	Painful arc Aggravated by certain movements	Marked by stiffness in all directions

Supraspinatus tendinopathy

Supraspinatus tendinopathy can vary in intensity from mild to extremely severe. The severe cases usually involve calcification (calcific periarthritis) of the tendon, which has a very rapid onset, and spread to the subacromial bursa (subacromial bursitis).

The impingement tests⁵

These are effective tests for supraspinatus lesions as they force impingement of the rotator cuff and bursa under the acromion. One of these tests is the ‘emptying the can’ resistance test. The arm is placed in the ‘emptying the can’ position (90° of abduction, 30° of horizontal flexion and full internal rotation). Elevation of the arm is resisted against the therapist’s downward push. This also tests the strength of supraspinatus. It has a sensitivity of 90% and specificity of 54% for supraspinatus tendinitis in blinded trials.¹³ Another is the ‘drop arm’ test, where the arm is abducted to 90° and the patient asked to descend the arm slowly and in a controlled manner. A positive result is sudden dropping with or without pain. Impingement can also be tested in external rotation when the arm is abducted to 90° and externally rotated. Other tests include those of Neer and Hawkins.⁶

Treatment¹²

Systematic reviews to date have a lack of sufficient information to provide conclusive evidence-based recommendations for treatment.¹⁴ For analgesia, paracetamol taken orally is first line and if inadequate, NSAIDs alone or in combination.¹² Corticosteroid injections and physiotherapy could improve range of movement. Experienced therapists believe that peritendon and subacromial corticosteroid injections are efficacious in selected patients.

- Rest during the acute painful phase
- Analgesics and NSAIDs (up to 4 weeks)
- Peritendon or subacromial injection (if no tears on ultrasound)
- Physiotherapy—an active program including scapular stabilising exercises and rotator cuff strengthening
- Surgery—consider after 3–6 months, usually subacromial decompression, sometimes excision of calcium

Injection technique

An infiltration into the subacromial space is a simple procedure that, once learned, is usually straightforward. Approach laterally through the deltoid into the space beneath the acromion—if too high the bony acromion impedes the needle, so angle it lower. There should be no resistance to depressing the plunger, which is almost painless.

Once the general injection is mastered, the ideal injection is a specific injection into the tendon. As a rule the therapeutic result is quite dramatic after one or two days of initial discomfort (often severe). The tendon can be readily palpated as a tender cord anterolaterally as it emerges from

beneath the acromion to attach to the greater tuberosity of the humerus. This identification is assisted by depressing the shoulder via a downward pull on the arm and then externally and internally rotating the humerus. This manoeuvre allows the examiner to locate the tendon readily.

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Method

- Identify and mark the tendon.
- Place the patient's arm behind the back, with the back of the hand touching the far waistline. This locates the arm in the desired internal rotation and forces the humeral head anteriorly.
- Insert a 23-gauge 32-mm needle under the acromion along the line of the tendon, and inject around the tendon just under the acromion (see FIG. 52.5). If the gritty resistance of the tendon is encountered, slightly withdraw the needle to ensure that it lies in the tendon sheath.
- The recommended injection is 1 mL of a soluble or long-acting corticosteroid with 5 mL of 1% lignocaine.

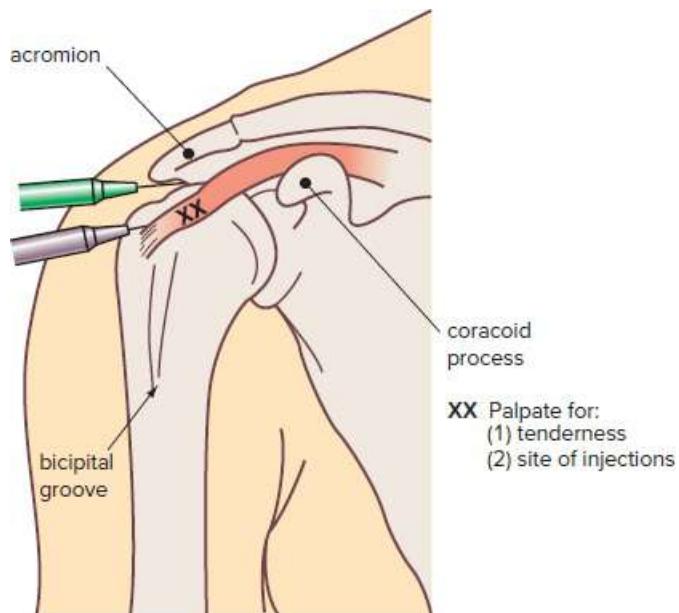


FIGURE 52.5 Injection placement for supraspinatus tendinopathy. Green needle: standard subacromial space. Grey needle: adjacent to subacromial tendon insertion.

Persistent supraspinatus tendinopathy

There are three factors to consider with this problem: all of them may potentially be referred for surgery.

- 1. A very tight subacromial space. Consider referral for subacromial decompression by division of the thickened coracoacromial ligament. Even in younger patients this procedure (with or without acromioplasty) may be indicated for those with pain persisting beyond 12 months.
- 2. Rotator cuff tear or degeneration. In middle-aged and elderly patients, persisting tendinitis is usually due to rotator cuff tear and degeneration, an underdiagnosed condition. Surgery aims to repair an early tear.
- 3. Calcification of the tendon. This problem usually settles but occasionally surgical intervention is necessary.

Typical pain profile—supraspinatus tendinopathy (subacromial impingement)

Site:	the shoulder and outer border of arm; maximal over deltoid insertion
Radiation:	to elbow
Quality:	throbbing pain, can be severe
Frequency:	constant, day and night
Duration:	constant
Onset:	gradual or sudden, such as straining the shoulder (e.g. dog on leash, working under car, fall onto outstretched arm)
Offset:	nil
Aggravation:	specific movements, putting on shirt, toilet activity, lying on shoulder (unable to sleep)
Relief:	analgesics only
Associated features:	trigger point over supraspinatus origin
Examination (typical features):	painful resisted abduction painful arc positive impingement test positive 'emptying the can' sign
Diagnosis:	clinical, but high-resolution ultrasound if doubtful

Other rotator cuff lesions

The patient may present with dominant signs of subscapularis or infraspinatus lesions, or a combination of two or three tendinous lesions, including the supraspinatus. This problem could be confused with milder adhesive capsulitis, hence the value of investigations such as ultrasound.

Management

A subacromial space injection of 1 mL of corticosteroid and 2–3 mL of 1% local anaesthetic, using the posterior approach, generally achieves a good result for multiple affected rotator cuff tendons with or without subacromial bursitis (aim for only one injection). Relative rest is advisable.

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Method

With the patient sitting upright the large posterior gap between the medial acromial ridge and the humeral head is identified by palpation from behind. The needle (23-gauge, 32 or 38 mm long) is inserted into this gap just inferior to the acromion. The solution should flow into this space without resistance.

Rotator cuff tears

Asymptomatic rotator cuff tears are common, being present in 4% of people <40 years old and in more than 50% of those over 60 years, but a significant number will become symptomatic over time.¹² Explain to the patient that ‘the rotator cuff is worn not torn’, rather like the frayed heel of a sock that may have a split in it. The defect can be palpable.

Diagnostic tip: 98% specificity for all three signs:¹⁵

- supraspinatus weakness
- weakness in external rotation
- impingement (in external or internal rotation or both)

If two of these three tests are positive in a patient over 60, there is a 98% chance of a rotator cuff tear. Refer for surgical repair.

Subacromial bursitis

Subacromial (subdeltoid) bursitis is the more severe association of rotator cuff pathology and may require hospital admission for pain control. It is the only inflammatory disorder around the shoulder joint where localised tenderness is a reliable sign.

Management

- Strong analgesics (e.g. paracetamol and codeine)
- Large local injection of 5–8 mL of local anaesthetic into and around the bursa just beneath the acromion, followed immediately by 1 mL of corticosteroid (long-acting) into the focus of the lesion

Adhesive capsulitis¹²

Adhesive capsulitis or idiopathic frozen shoulder is an acute inflammation affecting the glenohumeral joint, which becomes fibrotic and contracted. It can arise spontaneously or post injury and may be partial or global, which is the classic cause of the ‘frozen shoulder’.

Differential diagnoses include monoarticular rheumatoid arthritis, a crystal arthropathy such as gout and septic arthritis. It is worse in diabetes. It is common and estimated to affect, to at least some degree, 2–5% of the general population and 10–20% of those with diabetes.¹⁶ 12% develop bilaterally.

It generally occurs in three stages:¹⁶

1. ‘freezing, frozen and thawing’—an inflammatory painful phase of 2–9 months
2. a fibrotic contracted (frozen) phase of 4–12 months
3. partial or complete resolution (thawing) of 5–26 months

Treatment

Conservative management involving physiotherapy is best practice.

For analgesia choose between paracetamol, paracetamol with NSAIDs, and NSAIDs alone (weigh the risk). For severe pain, oral corticosteroids rapidly alleviate pain, improve function and may provide sustained benefit. A typical dose is prednisolone 30 mg (o) daily for 3 weeks, then taper dose over next 2 weeks and cease.¹⁷

This problem, which can persist for at least 18–24 months (average time to restore motion is 30 months) and is usually self-limiting, can be treated with an intra-articular injection of corticosteroid but it is often unsuccessful. One injection treatment for severe persistent pain is arthrographic hydrodilatation of the glenohumeral joint with a large quantity of sterile normal saline solution (to stretch the capsule) ± corticosteroid. This procedure should be performed slowly to produce an audible ‘pop’ as fluid distends into the subacromial and subcoracoid bursae. Another important treatment is severing adhesions under arthroscopic control. The rule is: if very stiff (frozen) use arthroscopy; if more mobile use a distension procedure. Active exercises are important to restore function. Fifty per cent of people with adhesive capsulitis do not regain full normal movement if untreated.

Current evidence from systemic reviews indicates that both hydrodistension and intra-articular injections are likely to be beneficial.^{12,18}

Exercise in the acute phase can exacerbate pain but a gentle program is useful when it settles. If stiffness persists, manipulation under anaesthesia and/or arthroscopic debridement of adhesions may be helpful.²¹

Usually affects people in their 40s, 50s and 60s.

Site:	around the shoulder and outer border of arm
Radiation:	to elbow
Quality:	deep throbbing pain
Frequency:	constant, day and night (severe cases)
Duration:	constant
Onset:	spontaneous, usually gradual, wakes the patient from sleep
Offset:	nil
Aggravation:	activity, dressing, combing hair, heat
Relief:	analgesics only (partial relief)
Associated features:	stiffness of arm, may be frozen
Examination (typical features):	'frozen' shoulder (some cases) various active and passive movements painful and restricted, especially extension and at extremes of movement resisted movements pain-free (patient compensates with scapulo-humeral movements)
Diagnosis:	high-resolution ultrasound (plain X-ray normal)

Bicipital tendinopathy

Bicipital tendinopathy is a lesion such as fraying or tearing of the long head of the biceps, which causes pain in front of the shoulder. Important signs include pain on resisted flexion of the elbow joint and on resisted supination with the elbow flexed to 90° (Speed test) and forearm pronated (Yergason test). A painful arc may be present when the intrascapular part is affected. Hence it is often confused with one of the rotator cuff lesions. Sometimes it is possible to elicit local tenderness by palpation along the course of the tendon in the bicipital groove. This is best done when the arm is externally rotated. Most active shoulder movements, especially external rotation, bring on the pain.

Bicipital tendinopathy usually follows chronic repetitive strains in young to middle-aged adults (e.g. home decorating, weight training, tennis, swimming freestyle, cricket bowling and baseball pitching). Two complications are complete rupture and subluxation of the tendon out of its groove.

One treatment to consider is a corticosteroid and local anaesthetic injection at the site of maximal tenderness in the bicipital groove (see FIG. 52.6). As a rule it is best to refer a significant

lesion.

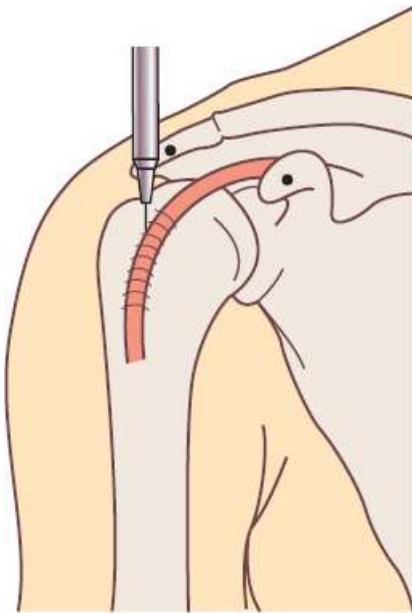


FIGURE 52.6 Injection placement for bicipital tendinopathy

⌚ Rupture of the biceps tendon

Rupture of the long head of biceps usually occurs in the older person. It may be spontaneous or occur after lifting or falling on the outstretched hand. The patient usually feels a tearing or snapping sensation in the shoulder. The shoulder may be painful and difficult to move. The upper arm looks bruised and a lump due to rolled-up belly of biceps is obvious on flexion of the elbow. Active treatment is not usually indicated but surgical intervention is appropriate for young, active people, especially those in power sports. Rupture of the distal tendon (short head) attached to the radius may occur with heavy lifting or similar load. Bruising appears at the elbow.

⌚ Polymyalgia rheumatica

It is very important not to misdiagnose polymyalgia rheumatica in the older person (over 50 years) presenting with bilateral pain and stiffness in the shoulder girdle. It may or may not be associated with hip girdle pain. Polymyalgia rheumatica sometimes follows an influenza-like illness. The patients seem to complain bitterly about their pain and seem flat and miserable. In the presence of a normal physical examination they are sometimes misdiagnosed as 'rheumatics' or 'fibrositis'.

Site:	shoulders and upper arms (see FIG. 52.7)
Radiation:	towards lower neck
Quality:	a deep, intense ache
Frequency:	daily
Duration:	constant but easier in afternoon and evening
Onset:	wakes with pain at greatest intensity
Offset:	nil
Aggravating factors:	staying in bed, inactivity
Relieving factors:	activity (slight relief)
Associated features:	severe morning stiffness 'in muscles'; malaise; ± weight loss, depression
Diagnosis:	greatly elevated ESR (can be normal)
Treatment:	corticosteroids give dramatic relief but long-term management can be pi

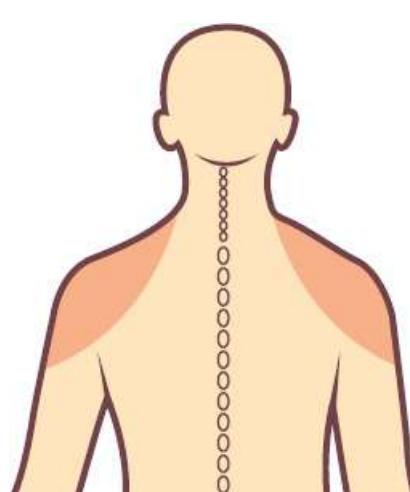


FIGURE 52.7 Polymyalgia rheumatica: typical area of pain around the shoulder girdle

⌚ Posterior dislocation of the shoulder

This is a rare form of shoulder instability, which is often misdiagnosed. On first inspection there may not be an obvious abnormality of the shoulder contour. Often sports-related, but consider this condition if there is a history of electric shock or a tonic-clonic convulsion. The major

clinical sign is painful restriction of external rotation, which is usually completely blocked. Routine shoulder X-rays following trauma should always include the ‘axillary shoot-through’ view and then the diagnosis becomes obvious. Early diagnosis and management can prevent a poor outcome and perhaps litigation.^{15,20}

Recurrent subluxation

Recurrent anterior or inferior subluxations, or both, are probably more common than recurrent dislocations, yet frequently are not diagnosed. Those who complain of attacks of sudden weakness and even a ‘dead arm feeling’ lasting for a few minutes with overhead activities of the arm should be investigated for this condition.

The disorder is usually apparent on careful stress testing of the shoulder. Air-contrast CT arthrography is considered the best investigation. Surgery is usually curative while conservative treatment often fails for younger patients.

Glenoid labrum injuries^{4,7}

The glenoid labrum is the ring of fibrous tissue attached to the rim of the glenoid and provides volume to the cavity and stability to the glenohumeral joint. Injuries to the labrum are divided into superior labrum anterior to posterior (SLAP) or non-SLAP lesions and further into stable and unstable lesions.

Tests to assess these injuries are the O’Brien, Crank and Speed tests (refer to various YouTube videos).

Non-SLAP lesions include degenerative, flap and vertical labral tears as well as unstable lesions such as the classic Bankart lesion, where the labrum and capsule is detached from the rim (see CHAPTER 124) .

Shoulder instability^{5,17}

Recurrent shoulder instability can be divided into three main types.

1. Those with a tendency to generalised laxity of multiple joints including the shoulder and which tend to dislocate with minor injuries. Surgery is less effective and treatment is based on improving muscular stability with physiotherapy rehabilitation.
2. Those following trauma, which includes avulsion of the anterior labrum (Bankart lesion). Physiotherapy tends to be less effective and the patients often require surgical repair.
3. Those with chronic rotator cuff tendinopathy/impingement who develop subtle instability. Refer first to a sports physician or physiotherapist for assessment and management, preferably conservative initially.

The ‘apprehension’ test is useful to confirm the diagnosis of traumatic anterior

instability. In this test the patient lies supine while the arm is externally rotated with the elbow flexed to 90°. The test is more reliable when the patient expresses apprehension that the shoulder will ‘come out’, rather than pain.

Osteoarthritis of the glenohumeral joint

This is usually secondary to local trauma, long-standing rotator cuff lesions and multiple surgical interventions. Shoulder movements are stiff and usually restricted in all directions. Plain X-rays show typical osteoarthritic changes. Treatment includes basic analgesics and short courses of NSAIDs plus exercises to improve mobility. Patients usually manage to cope with osteoarthritis of the shoulder, but for severe pain and stiffness, arthroplasty or joint replacement should be considered.

Acromioclavicular disorders

Osteoarthritis is usually traumatic, from a direct blow or fall onto the shoulder with an abducted arm, or degenerative and is relatively common in builders, sportspeople (especially rowers) and the elderly. Night pain is experienced when lying on the affected side. There is a full range of movement but pain on full elevation. Point tenderness over the ACJ is typical of ACJ pathology. The Bell–van Riet test is diagnostic. A key test for ACJ pain is the Paxinos sign, which is positive when pain is elicited on compression of the joint by placing one hand on the back of the acromion and one on the clavicle. It is treated with rest, support and analgesics. Follow the Rockwood classification of ACJ injuries. Intra-articular injections of corticosteroids can be used for resistant or severe cases. If these measures are ineffectual, pain may be relieved by excision of the lateral end of the clavicle.

When to refer

- Persisting night pain with shoulder joint stiffness
- Persisting supraspinatus tendinopathy; consider possibility of rotator cuff tear or degeneration, especially in the elderly
- Persisting restriction of movement, such as restricted cross-body flexion (indicates capsular constriction)
- Persisting supraspinatus tendinopathy or other rotator cuff problem because decompression of the subacromial space with division of the coracoacromial ligament ± acromioplasty gives excellent results
- Confirmed or suspected posterior dislocation of the shoulder—the most commonly missed major joint dislocation
- Confirmed or suspected recurrent subluxation or avascular humeral head
- Children with shoulder joint instability

- Swimmer's shoulder refractory to changes in technique and training schedule
- Severe osteoarthritis of the glenohumeral joint (which usually follows major trauma) for consideration of prosthetic replacement
- Severe osteoarthritis of the AC or glenohumeral joint

Practice tips

- Consider dysfunction of the cervical spine, especially C4–5 and C5–6 levels, as a cause of shoulder pain.
- Tendinitis and bursitis are very refractory to treatment and tend to last for several months. One well-placed injection of local anaesthetic and corticosteroid may give rapid and lasting relief.
- Test for supraspinatus disorders (including swimmer's shoulder) with the impingement tests, including the 'emptying the can' test.
- An elderly person presenting with bilateral shoulder girdle pain has polymyalgia rheumatica until proved otherwise. Relief from corticosteroids is dramatic. Although bilateral, it may start as unilateral discomfort.
- Most of the shoulder joint disorders become chronic or persist for at least 12 months, but eventually spontaneous resolution can be expected.
- Dysfunction of the cervical spine can coexist with dysfunction of the shoulder joints.
- Correlation between clinical symptoms and the degree of tendon injury or failure is not reliable.¹⁶

Patient education resources

Hand-out sheets from *Murtagh's Patient Education* 8th edition:

- Exercises for your shoulder
- Polymyalgia rheumatica
- Shoulder: frozen shoulder
- Shoulder: tendinitis