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# Introduction

This document contains supplementary information about the more complex or less well-known procedures that are classified within OPCS-4.

**Where information has been added or changed in this release of the supplementary information this is indicated using a** **\* symbol in the title of the entry.**

It is important coders possess knowledge of the anatomy of the human body (coders can reference their Basic Anatomy and Physiology Instruction Manual and the eLearning module on [TRUD](https://www.uktcregistration.nss.cfh.nhs.uk/trud3/user/guest/group/0/pack/10/subpack/85/releases)) and are aware of the methods and processes used when a procedure/intervention is performed on a patient.

This information can be used alongside the clinical coding standards and guidance given in the National Clinical Coding Standards OPCS-4 reference book that must be applied when assigning OPCS-4 codes.

There are a host of reference sources available to coders if they wish to find out how a procedure is performed, such as surgical textbooks, patient information leaflets, the internet and there is a wealth of knowledge held by clinical staff within Trusts.

Coders should build on this supplementary information document by performing their own research and speaking with the responsible consultants and other clinicians and clinical staff within their Trust. The internet is of great use when finding out more information about a procedure and how or why it is performed. There are several reliable websites that give information about diagnoses, treatments and procedures. A few are listed below:

* [NHS Website](https://www.nhs.uk/conditions/)

* [National Institute for Health and Clinical Excellence (NICE)](http://www.nice.org.uk/)**,** particularly the [Interventional Procedures section](http://guidance.nice.org.uk/IP/Published) which advises the NHS on whether new interventional procedures are safe and effective enough to be used routinely. Each procedure has a guidance document explaining why and how the procedure is performed. OPCS-4 codes are also recommended for each of these procedures. *These codes are provided by the Clinical Classifications Service and can be used by coders as an indication of how the procedure would be coded if performed in exactly the same way as described within the ‘Outline of the procedure’ section of the guidance document. The codes listed would be subject to change if the procedure was performed differently in any way.*
* Patient.co.uk
* [Cancer Research UK](http://www.cancerresearchuk.org)
* [WebMD](http://www.webmd.com/)
* There are also a number of websites provided by the Royal Colleges(such as [Royal College of Obstetricians and Gynaecologists](http://www.rcog.org.uk/)) and British associations, societies and institutes (such as [The Renal Association](http://www.renal.org/home.aspx)) which provide reliable clinical information.

You can also find a database of [Useful Links](https://nhsengland.kahootz.com/connect.ti/t_c_home/view?objectId=358244#358244) on Delen.

## Chapter A Nervous System (A01-A84)

### Excision of transcranial dermoid cyst (A02.7)

Dermoid cysts are often restricted to the surface of the skin and are removed by excising the lesion from the skin. They may be rooted within the bones of the skull and involve excision of the lesion from the skull bones. They may be intracranial and involve excision of tissue from the brain. However, transcranial dermoid cysts connect through the skull into the brain and require excision of the cyst from the brain and the skull bones.

### Repair of post-traumatic meningoencephalocele (A06.4)

The repair of a post-traumatic meningoencephalocele (growing fracture of cranium) involves both the repair of the dura that has herniated through the fractured cranium and repair of the cranial fracture which is often performed using a bone graft harvested from the calvarium.

### Stereotactic radiosurgery on tissue of brain (A10.7)

This is a procedure where the head is fixated mechanically to ensure there is no movement so that precise areas of the brain can be targeted by radiation to destroy tumour cell DNA. This radiotherapy is usually performed using a gamma knife but can also be performed using a linear accelerator machine (LINAC), both of which are types of external beam radiotherapy.

### Cortical mapping (A11.4)

This is intracranial mapping used in the assessment of patients with medically intractable epilepsy prior to surgical treatment for epilepsy. The aim of cortical mapping is to identify the areas of the brain supporting essential functions, such as speech and movement prior to neurosurgery. The identification of the so-called eloquent cortex means the surgeon can avoid damaging it; this will avoid a post-operative functional deficit. This procedure is performed as an inpatient and firstly involves the placement of depth (**A11.1**) or surface (**A11.2**) electrodes. These electrodes are then stimulated using small electrical currents to reproduce function and establish the site of function in relation to the site where the epilepsy originates. It takes several hours and is spread across a number of days. Once the findings are adequately collected and a map has been produced, the patient will return to theatre and have the electrodes removed.

Cortical mapping can also be performed during a procedure on the brain when the patient is awake. These are usually performed for patients with brain tumours that are in areas of the brain where important functions reside like speech or movement. The surgeon operates on the patient whilst they are awake and performs cortical mapping in theatre before and during the surgical excision (the patient may also need a psychologist with them to test language). The brain is stimulated with a probe to identify which parts of brain control movement, speech and language to avoid them during the excision.

### Radial optic neurotomy (ii) (A36.4)

RON offers hope for patients suffering severe vision loss from central retinal vein occlusion (CRVO). The optic nerve exits through a relatively small opening in the back of the eye; the tight ring of tissue surrounding the nerve may literally help to squeeze the vein closed. Radial optic neurotomy directly releases this ‘napkin-ring’ compression with a microscopic incision in the margin of the nerve, making it easier for blood to exit the eye.

### Nerve grafting/transferring procedures

Nerve grafts and transfers are almost invariably carried out using microsurgical techniques because of the relatively small size of the structures involved, and also to reduce damage to the nerve fibres themselves by ensuring that the sutures pass through the perineurium (connective tissue sheath surrounding a bundle of nerve fibres) and not the core of the nerve. Microsurgery is surgery on minute body structures or cells performed with the aid of a microscope.

Nerve grafting is the use of a length of nerve from a distant site, commonly the sural nerve, to replace a section of nerve that has been removed or irreparably damaged.

A ‘primary’ graft is a graft implanted at the time of an initial procedure, such as repair of an injured nerve when the damaged nerve is either irreparable or a segment is missing, or when a segment of nerve has been removed because it is the origin of a neoplasm, or has become involved by local spread of an adjacent tumour.

‘Secondary’ procedures are those carried out at a later time after the initial injury or procedure. This is where the original problem affecting the nerve trunk had not been repaired because of the amount of local soft tissue trauma, or for fear of infection in a heavily soiled wound.

Nervetransfer involves an adjacent nerve being divided and then sutured to the distal stump of another nerve in the vicinity. A nerve transfer is not the same as a nerve repair, as the latter would assume the normal anatomy of the injured nerve had been restored. In a nerve transfer, the proximal part of the recipient nerve is not reconnected to the distal portion, the input to that distal portion coming from the donor nerve which must be divided. An example of a nerve transfer procedure is a hypoglossal-facial anastomosis which is the joining of the hypoglossal nerve in the submandibular region to the distal stump of the facial nerve in the parotid region following facial palsy.

### Exploration of a nerve

This is essential to determine the length of the nerve that is to be replaced/grafted and, in the context of the brachial plexus, how many of the nerve trunks have been traumatised. Exploration is also necessary to determine whether nerve *transfer* or *grafting* is the most appropriate treatment.

## Chapter B Endocrine System and Breast (B01-B45)

### Anterior skull base reconstruction

The most common approach for pituitary surgery is trans-sphenoidal (through the sphenoid sinus) with the use of an endoscope inserted via the nostril. This approach may create a defect in the anterior skull base which can cause the leakage of cerebrospinal fluid. When a leakage occurs, the surgeon may decide to close the defect created in the anterior skull base with the use of a mucosal flap. This is known as an “anterior skull based reconstruction”.

### Parathyroid washout (B16.4)

A parathyroid washout is a nuclear medicine imaging procedure where a radio-labelled product is administered, and the period of time taken for decay and excretion is measured and used to detect parathyroid activity.

### Evacuation of post-operative haematoma from breast (B33.1)\*

A patient who has undergone a simple mastectomy or skin-sparing/ nipple sparing mastectomy with reconstruction may develop a post-operative haematoma which requires a further operation.  During this operation the patient is given a general anaesthetic and the previous skin incision wound is re-opened.

* After a simple mastectomy the haematoma is found in the space between the skin and subcutaneous fat (skin-flap) and the chest wall muscles.
* After a skin/nipple sparing mastectomy with reconstruction the haematoma is found in the space between the skin and subcutaneous fat (skin-flap) and reconstruction, or behind the reconstruction or surrounding the tissue-expander/ implant.

Suction is used to drain the blood together with finger dissection to break up the clots into smaller pieces. The space is then washed out with saline and carefully inspected to identify any active bleeding points and haemostasis achieved. A decision is made whether to site a wound drain and the skin wound is re-sutured.

In rare cases a small post-mastectomy haematoma (after simple mastectomy) may be drained under local anaesthesia in clinic with or without radiological guidance.

### Reconstruction of breast using glandular remodelling (B29.6)

In this procedure, a defect left by the wide local excision of breast lesion is reconstructed using surrounding glandular breast tissue. The tissue is dissected away from the chest wall to leave mobile pillars of glandular breast tissue that are sutured together to fill in the defect.

Alternatively, an internal flap of glandular tissue can be created and rotated into the defect left by the wide local excision.

### Reconstruction of breast using dermoglandular flap (B29.7)

This includes a procedure where the nipple areola complex and lesion are excised down to the chest wall. The epidermal incision is continued along the dermal glandular pedicle around the pre-marked new nipple-areola complex. The epidermal layer of the pedicle is removed with preservation of the disk of skin which will form the new nipple-areolar complex. Undermining of the glandular tissue at the level of the pectoralis fascia of the breast allows mobilisation and advancement of the dermal glandular pedicle. The skin is then sutured and dressed.

### Reconstruction of breast using pedicled omental flap (B39.4)

When a pedicled flap is used, the omentum remains connected to the terminal branch of the right gastroepiploic artery. A skin-sparing mastectomy or breast-conserving surgery is then performed, together with axillary lymph node clearance as required. A subcutaneous tunnel is created from the inframammary skin fold towards the xiphoid process of the sternum. An incision is made at the linea alba to allow communication with the abdominal cavity. Forceps are inserted into the abdominal cavity to draw out the omentum through the tunnel. The omentum is then fixed to the major pectoral muscle with staples or sutures, and the mastectomy incision is closed.

### Reconstruction of breast using free omental flap (B39.5)

When a free flap is used, the roots of the right gastroepiploic vein and artery are clipped and resected. The flap is removed through a small incision in the right lower abdominal wall and inserted via the mastectomy wound. Microsurgery is used to perform anastomosis of the epiploic artery to the internal mammary artery. The omentum is fixed to the major pectoral muscle with staples or sutures, and the mastectomy incision is closed.

## Chapter C Eye (C01-C91)

### Minimally invasive glaucoma surgery (MIGS)

Minimally Invasive Glaucoma Surgery is a procedure to drain aqueous fluid from the anterior chamber of the eye which involves minimal disruption to surrounding tissues. It is usually associated with the placement of a device or tube to facilitate the drainage of aqueous fluid.

### Reconstruction of cavity of orbit (C05.1)

Correction of enophthalmos involves reconstruction of the cavity of the orbit, the orbital bones may be repaired and a synthetic or a bone or cartilage autograft may be used to provide a better shape and to correct the sunken appearance of the eye.

### Marsupialisation of canaliculus (C29.4)

Marsupialisation is the exteriorisation (bringing to the surface) of a cyst or other such enclosed cavity by resecting the anterior wall and suturing the cut edges of the remaining wall to adjacent edges of the skin, thus creating a pouch.

### Insertion of adjustable suture into muscle of eye (C35.3)

This is a method of reattaching an extraocular muscle by means of a stitch that can be shortened or lengthened within the first postoperative day, to obtain better ocular alignment. Adjustable suture allows for better final postoperative outcome.

### Viscocanulostomy (C60.6)

This is carried out to treat glaucoma using a special instrument called a Grieshaber and is an alternative to trabeculectomy. It is a much more difficult procedure than standard trabeculectomy as it needs additional equipment. The procedure basically involves production of superficial and deep scleral flaps, excision of the deep scleral flap to create a scleral reservoir, and unroofing of Schlemm’s canal. A high-viscosity viscoelastic, such as sodium hyaluronate, is used to open the canal and create a passage from a scleral reservoir to the canal. The superficial scleral flap is then sutured watertight, trapping the viscoelastic until healing takes place.

### Viscogonioplasty (C61.5)

Viscogonioplasty is a procedure which is carried out during routine phacoemulsification and intraocular lens placement. Following the phacoemulisification and lens placement, the surgeon will deepen the anterior chamber with a heavy viscoelastic. Viscoelastic is then injected into the angle for 360 degrees, and care is taken to avoid directly touching the trabecular meshwork.

### Operations following glaucoma surgery (C65)

This category includes codes for any action on a bleb, e.g. needling, injection, revision etc. During trabeculectomy a valve is created into the tissue of the eye wall so that fluid from inside the eye will drain quickly and lower intraocular pressure. In some cases, the valve works ‘too well’ and intraocular pressure becomes too low. In severe cases fluid leaks beneath the conjunctiva causing it to balloon and protrude from the top of the eyeball causing the bleb.

### Retinal tamponade

This is a surgical procedure used to treat retinal tears and detachments. The retina is reattached by injection of gas or oil into the vitreous cavity.

## Chapter D Ear (D01-D28)

### Atticoantrostomy (D12.7)

This is a procedure for clearance of disease processes localised to the attic and mastoid antrum. The bony wall dividing the meatus from antrum is removed. It generally denotes removal of bone from within outwards (i.e. starting from tympanic cavity).

### Attachment of bone anchored hearing prosthesis (D13)

When a patient has a bone anchored hearing aid (BAHA), they have an implant that works by direct stimulation of the cochlea (inner ear) through a small, surgical implant placed within the skull behind the ear. This implant is made of titanium, a material that permits the patient's own bone to integrate within the implant itself. After the implant has become fully integrated, the patient is able to wear a small, high-fidelity sound processor that can be snapped on and off. This externally worn processor transmits sounds to the internal implant which, in turn, causes vibrations that directly and efficiently stimulate the inner ear. As a result of this efficient stimulation, excellent hearing can be provided to people who do not have an ear canal and/or a normally functioning middle ear.

This kind of implant is different to a cochlear prosthesis classified at category **D24 Operations on cochlea** which consists chiefly of a microphone and receiver, a processor that converts speech into electronic signals, and an array of electrodes that transmit the signals to the auditory nerve in the inner ear. It also differs from an auricular prosthesis at **D05 Attachment of auricular prosthesis** as it is anchored in bony tissue deeper in the ear.

## Chapter E Respiratory Tract (E01-E98)

### Median drainage of frontal sinus (E14.7)

This procedure involves the removal of the inferior portion of the interfrontal septum, the superior part of the nasal septum, and the frontal sinus floor.

### Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) (E63.4)

This procedure can be performed on patients who are being tested for various diseases, including lung cancer. Under local or general anaesthesia, a thin flexible telescope (fibreoptic bronchoscope) is inserted into the airways. Images of the region between the two lungs (the mediastinum) are obtained using an ultrasound probe attached to the bronchoscope. The operator uses these images as a guide when taking a biopsy from suspect masses to confirm the presence and nature of disease. The aim of the procedure is to help reach a diagnosis and establish whether or not the disease has spread.

### Endo-oesophageal ultrasound examination of mediastinum (E63.3)

This procedure is also described as transoesophageal ultrasound examination of mediastinum. This is done by introducing the needle through the biopsy channel of the echoendoscope. Using pulse waved doppler ultrasonography, the needle is advanced through the wall of the oesophagus and guided into the target lesion. This technique allows the study of internal systems by performing an ultrasound through the intestinal wall by means of an endoscopy probe provided with an ultrasound device tip, or ultra-thin ultrasound wire placed inside a regular endoscopy probe.

### Endoscopic thermal bronchoplasty (E67.1)

This procedure is performed using a specially designed catheter which is introduced via an endoscope into the bronchial tree. Short pulses of radiofrequency energy are applied to portions of the airway.

### Nebuliser therapy and ventilation (E85.5 and E89.3)

Nebuliser therapy is used for administration of nebulised medication to improve breathing. This is *different* from nebuliser ventilation. Nebuliser ventilation is used for life support where a patient is unable to breathe without assistance.

### Diagnostic assessment of circulatory oxygenation using reduced oxygen air (E87.4)

This code *includes* flight assessment. The effects of increased altitude and associated reductions in air pressure can result in expansion of the air or gas trapped within the body. Trapped air or gas can be located in many places including the nasal sinuses, the tubes within the ears, the abnormal pockets within the lung (bullae), the space between the outer layer of the lung and the inner layer of the chest wall causing a pneumothorax, and internal organs in the abdominal cavity.

As atmospheric pressure drops, trapped air expands. This explains the “ear-popping” we feel when flying. When air is trapped in the chest, the results of this gas expansion can be life-threatening. Testing often includes measurement of blood oxygen level and general lung function tests. If a patient does not require oxygen at baseline but has a borderline lung function, other tests may be recommended to calculate their resting oxygen level under in-flight conditions. These include breathing a gas mixture with lower than normal levels of oxygen and/or testing in a hyperbaric chamber where pressure is lowered to simulate flight conditions.

## Chapter F Mouth (F01-F67)

### Dental procedures\*

There are several different systems of dental notation used within the NHS to identify which tooth/teeth has/have been treated, which can differ between Trusts, as well as between primary and secondary care providers. Each notation system also has means of differentiating between primary and secondary dentition. The two most frequently used methods of notation in the UK are the Alphanumeric (UK) and Palmer which classify teeth as below:

Table

Description automatically generated

Table

Description automatically generated

Palmer notation may also be presented in the format of the diagram below, although this is becoming less commonplace with the increasing use of electronic patient records:

Rt

Lt

12345678

87654321

Lower Teeth

Upper Teeth

### Coronectomy (F09.6)

This procedure aims to remove the crown (all enamel) of an impacted wisdom tooth whilst leaving the root and pulp undisturbed, therefore avoiding direct or indirect damage to the inferior alveolar nerve.

### Closure of apex of tooth (F12.3)\*

During tooth development, the apex of the tooth root remains open for a period of time after the tooth has fully erupted into the mouth. A tooth may also have an open apex due to infection, trauma or immature development. An open apex allows bacteria to directly access the vital structures which keep the tooth “alive” including the blood vessels and nerves within the jaw.

An open apex requires closing to prevent deep infections, the extrusion of filling material and to facilitate root canal therapy, which can be done through apexification or apexogenesis procedures.

Apexification involves accessing and cleaning out the dental root, removing any necrotic material and plugging the apex using dental materials, usually calcium hydroxide, to facilitate the formation of a calcific barrier at the apex.

Apexogenesis is a similar technique to apexification; however, this method is used when root pulp vitality is preserved, with the aim of maintaining it and promoting the development of a natural dental root and apex. The technique leaves the apical third of the healthy pulp in place, to stimulate the natural formation.

### Orthodontic procedures (F14, F15, F65 & F66)\*

Orthodontic devices are classifiable by a number of attributes pertaining to their permanence and means of application to the patient, as follows:

**Movable orthodontic devices** are not fixed in place although are stationary when in situ, and are used to correct minor problems, or preserve previous dental adjustments made using fixed appliances. These should only be removed by the patient for cleaning or as a precaution during certain sports activities, as continuous use is required to achieve the desired result.

Movable devices normally consist of a plastic plate with small wires and springs attached to help with basic tooth correction but are not suitable when more complex tooth movements are required.

**Fixed orthodontic devices** consist of traditional braces directly attached to the teeth, usually made from metal and glued in place, these cannot be removed. These braces are often in place for at least 12 months to achieve the desired result and require follow-up treatment using retainers to maintain new dental positioning.

**Functional orthodontic devices** are used to correct malposition of teeth and bite abnormalities in younger patients, these involve devices which are applied to both the upper and lower teeth. As some functional devices are also moveable, these must be worn often and only removed for cleaning and when playing certain sports. Functional devices may either be a single piece which affects both jaws, or from two separate pieces whereby the upper and low jaw components interlock and adjust the jaw position.

### Insertion and removal of orthodontic anchorage (F14.6 and F14.7)

Under local anaesthesia a pilot hole is drilled into the maxilla or mandible and the orthodontic anchorage/screw is inserted through the bone cortex and into the alveolar bone using a screwdriver-like tool. More than one screw can be inserted if necessary. Orthodontic loading can be achieved immediately after insertion, although it is often undertaken at a second visit. Following completion of the orthodontic treatment the screw(s) can be extracted and the incision site can be expected to heal spontaneously.

### Preservation of alveolar ridge using graft (F19.2) and Augmentation of alveolar ridge (F11.2 and F11.3)\*

Preservation of the alveolar ridge following dental extraction is a technique which is widely used to prevent bone resorption, preserving the structure of the jawbone to allow for future implant procedures and more desirable aesthetics. Immediately following tooth extraction and removal of soft tissues, a graft is inserted into the socket, covered with a membrane, and then definitively closed using sutures. There is a wide variety of materials which can be used for both the graft and the membrane, although it is rare for an autograft to be used as the risk of resorption is very high. This procedure stimulates blood vessel formation and bone growth within the jaw, preserving the structure and shape.

Alveolar ridge augmentation utilises similar techniques to ridge preservation but does not take place at the same time as a tooth extraction. Ridge augmentation can take the form of soft tissue and/or hard tissue grafts depending on the patient’s anatomy. The gum is incised and lifted away, a bone graft is inserted along with a membrane (if required) and in some circumstances a dental implant is also performed.

### Smear of buccal mucosa (F43.1)

This diagnostic procedure is where exfoliated cells of the buccal mucosa are obtained by scraping with a tongue depressor in the oral cavity, i.e. a swab. These cells are then used for diagnostic analysis.

### Insertion of intraoral appliance (F67)\*

Intraoral appliances are used by dentists to improve temporomandibular joint (TMJ) function and help to alleviate symptoms such as pain. Bite guards, intraoral splints and occlusal appliances are all forms of intraoral appliances. They consist of removable acrylic appliances which are moulded to fit a patient’s teeth and are worn for various periods of time, often throughout the day and night.

Another type of intraoral appliance is called a Mandibular Advancement Splint (MAS) used in the treatment of obstructive sleep apnoea. The MAS is worn at night and moves the mandible forwards relative to the maxilla in order to widen the airway.

## Chapter G Upper digestive tract (G01-G82)

### Argon Plasma Coagulation (APC)

This is used to control bleeding from lesions within the gastrointestinal tract. It uses a high frequency electrical current often referred to as electrocautery to stem the bleeding lesion, using heat conduction through a beam of argon gas conducting an electrical current. This heat then cauterises the bleeding lesion to achieve haemostasis.

### Fibreoptic endoscopic coagulation of bleeding lesion using haemostatic spray (G20.2 and G46.3)\*

### These procedures are used as a treatment for bleeding lesions (including varices) in the gastrointestinal tract and involve the application of a haemostatic spray via a catheter inserted into the port of the endoscope. The ‘spray’ contains powder which is propelled by pressurised carbon dioxide or air; the powder rapidly concentrates clotting factors at the site of bleeding, forming an adherent coagulum.

### Examples of haemostatic sprays are EndoClot® and Hemospray®

### Insertion of stent into oesophagus NEC (G21.5)

This is used to record an oesophageal stent insertion using a catheter and guidewire carried out in the x-ray department under fluoroscopy control.

### Cytology of oesophagus using ingestible sponge (G21.6)\*

This procedure involves the collection of oesophageal cells for cytopathology and immunostaining using a CytospongeTM. This is a swallowable cell collection sponge, contained within a capsule, with an attached string. The capsule is ingested by the patient and dissolves in the stomach, at which point the internal sponge starts to expand. After 5-7 minutes the sponge will have fully expanded and is then retrieved using the attached string; as the sponge is retrieved, cells are collected from the lining of the oesophagus and the sponge is sent for laboratory testing.

The CytospongeTM test is used for detecting Barrett’s Oesophagus and oesophageal cancers in patients who have had long-term gastroesophageal reflux disease (GORD) symptoms, as well as other oesophageal conditions. Although patients with positive results for Barrett’s Oesophagus will still require endoscopic surveillance, it does eliminate the need for initial endoscopic screening procedures and can be performed in an outpatient setting.

### Endoscopic insertion of nasogastric or nasojejunal feeding tube (G47.5 and G67.5)

Upper gastrointestinal (UGI) endoscopy is often used to introduce nasogastric tubes in patients with difficulties in the classic procedure or in patients with oesophageal strictures. This procedure starts with a UGI endoscopy, a guide wire is then introduced through the operating channel of the endoscope. The endoscope is removed while the guide wire is introduced with synchronized movements. The distal end of the guide wire remains in the gastric cavity or jejunum when the endoscope is completely withdrawn. The NG or NJ tube is then inserted over the guide wire.

### Reversal of duodenal switch (G71.7)

In most cases the procedure will include division of multiple ileum anastomoses, reconstruction of ileum by re-anastomosis, and division of any adhesions. However, this will depend on patient anatomy and how the switch was achieved. In some cases, partitioning of stomach using staples can also be done, as is the creation of a temporary gastrostomy.

### Diagnostic endoscopic balloon examination of ileum (G80.3)

This procedure involves the placement of a balloon at the end of a special enteroscope. It is usually completed under GA but can take place under conscious sedation. The enteroscope and overtube with a balloon attached is inserted through the mouth and passed in the conventional fashion into the small bowel. The endoscope is then advanced a small distance in front of the overtube and the balloon is inflated. Using the assistance of friction at the interface of the enteroscope and intestinal wall, the small bowel is accordioned back on the overtube. The overtube balloon is then deployed, and the enteroscope balloon is deflated. This process can then be repeated until the entire bowel can be visualised. The enteroscope can also be inserted via the anus. Other names for this procedure are ‘balloon enteroscopy’, ‘single balloon enteroscopy’, ‘double balloon enteroscopy’ and ‘push pull enteroscopy’.

## Chapter H Lower digestive tract (H01-H73)

### Interval appendicectomy (H02.1)

If a patient presents with the acute symptoms subsiding and a fixed periappendiceal mass, presumed to be an abscess, the surgeon may decide to treat with antibiotics. If the symptoms subside fully, he may then perform an interval appendicectomy in planned theatre time. This would be performed in the same episode of care.

### Planned delayed appendicectomy NEC (H02.2)

Re-admission for appendicectomy following an acute episode of appendicitis.

### Prophylactic appendicectomy NEC (H02.3)

Sometimes, after a patient has suffered several attacks of sub-acute or chronic appendicitis, the surgeon will perform a prophylactic appendicectomy to prevent further instances of the disease.

### Incidental appendicectomy (H02.4)

Appendicectomy performed during the course of other abdominal procedures.

### Exteriorisation of appendix (H03.3)

This code classifies the creation of a stoma using the appendix. These types of stoma are commonly created for the treatment of chronic constipation and soiling in children. The appendix remains attached to the caecum, but its end is brought out on the abdominal wall. The appendix is then opened up to make a channel from the abdominal wall to the large intestine. The stoma is then used to perform bowel washouts (antegrade colonic enema (ACE).

### Diagnostic endoscopic examination of colon (H22)

During a colonoscopy, it is possible, with some technical skill, for the endoscopist to navigate past the ileocaecal valve and manoeuvre the colonoscope into the terminal ileum (intubation). Ileal intubation, with or without biopsy, can be performed at the end of a colonoscopy to indicate that the examination is complete. This method confirms successful completion of the colonoscopy, as the ileocaecal valve is a landmark of the caecum.

### Reanastomosis of rectum to anal canal and creation of anal sphincter (H50.5)\*

A Posterior Sagittal Anorectoplasty (PSARP) (included at **H50.5**) is a type of pull through operation that is used to repair anorectal malformations (ARM) in some children. This technique surgically creates the child’s anus within the sphincter muscle by disconnecting the rectum and surgically positioning it within the anal sphincter muscles to create an opening.

During this procedure the surgeon will check that there are no other anomalies visible that may require correction, for example, vaginal anomalies or urological anatomical issues.

Where the repair is more complex, for example, in the case of repairing a cloacal malformation, a vaginoplasty and urethroplasty may be performed in addition to the PSARP.

A cloacal malformation is congenital (present at birth) problem. It is a severe anorectal malformation where the vaginal canal, urethra and anorectal canal have formed as one pouch/outlet.

## Chapter J Other Abdominal Organs - Principally Digestive (J01-J77)

### Transection of liver (J07.4)

The first stage of the Associating Liver Partition with Portal Vein Ligation for Staged Hepatectomy (ALPPS) procedure involves the transection of liver parenchyma and portal vein ligation. The future liver remnant is also cleared of any lesions.

ALPPS is a 2-stage procedure which stimulates an accelerated hypertrophy of the future liver remnant, helping to avoid post-operative liver failure while removing the malignant disease.

## Chapter K Heart (K01-K78)

### Primary palliation of hypoplastic left heart syndrome (K17.3 and K17.4)

Hypoplastic left heart syndrome (HLHS) is a combination of congenital abnormalities of the left side of the heart, characterised by left heart underdevelopment (hypoplasia), particularly involving the left ventricle, mitral and aortic valves and thoracic aorta. Characteristic features of this syndrome are absent, hypoplastic and/or stenotic aortic valves, mitral valves, ascending aorta and aortic arch. The effect of these abnormalities is that oxygenated blood cannot enter and/or exit the left side of the heart, and there is a functionally single ventricle circulation, where systemic circulation is only maintained due to the ductus arteriosus being patent (open). Without intervention the condition is fatal in the first 2 weeks of life.

Staged reconstruction for HLHS requires up to three operations over three or more years and involves initial complex high-risk open-heart surgery. The first stage, primary palliation (better known as a Norwood procedure), is usually performed in the first one or two weeks of life while the arterial duct (ductus arteriosus) is kept open with a drug infusion (prostaglandin). The procedure involves reconstructing the hypoplastic aorta using the pulmonary trunk (detaching it from the branch pulmonary arteries) and inserting a synthetic interposition shunt between a systemic artery and a pulmonary artery (**K17.3**), or a valveless conduit between the dominant right ventricle and pulmonary artery (Japanese or Sano modification) (**K17.4**), to provide pulmonary blood flow, and finally an atrial septectomy. Occasionally this first stage procedure is delayed for 1-3 months if an additional initial stage is undertaken: banding of pulmonary trunk combined with transluminal stenting of the arterial duct (so-called hybrid procedure).

### Cardiomyoplasty (K23.6)

This is a surgical procedure whereby the patient's own body muscle is wrapped around the heart to provide support for the failing heart. In this procedure, the latissimus dorsi muscle is removed from the patient's back and is used to form a wrap around the heart to reinforce the weakened or damaged heart muscle. To enable this muscle to act like heart muscle it is first connected to a pulse generator which is triggered to copy the heart muscle contraction. After six to eight weeks the muscle is "conditioned" so that it is capable of behaving like heart muscle.

### Aortoventriculoplasty (K37.6)

This is a method of treatment for left ventricular outflow obstructions. The concept is based on creating a surgical defect which is patched in such a way as to provide the largest possible outflow to the left ventricle. The incision of the aorta continues down as far as necessary with the right ventricular wall, aortic ring and septum being cut. Reconstruction with an inner Dacron patch on the septum is completed by replacing the aortic valve with an adequate prosthesis, covering the aortic incision with the same patch, and patching the right ventricular opening with an outer patch.

### Cardioverter defibrillator introduced through vein (K59)

An ICD (Implantable Cardioverter Defibrillator) packs a lot of power into a little space. It sends electrical pulses to the heart when rhythms get dangerously out of control, effectively halting racing beats and protecting against Sudden Cardiac Death.

A cardioverter defibrillator which uses three electrode leads (**K59.6**) may also be documented as a biventricular defibrillator, or an implantable cardioverter defibrillator (ICD) when associated with cardiac resynchronisation therapy (CRT-D). CRT-D (implantable cardiac defibrillator enabled with cardiac resynchronisation therapy). This is used for patients with both an arrhythmia and heart failure.

The device is implanted into the heart as part of a system that includes three leads. These leads are specialised, thin insulated wires that attach to the CRT-P/D (pacing only, or defibrillator) device and deliver the therapy to the heart. When a patient has an additional diagnosis of atrial fibrillation, only two of the three leads are used but the device that delivers the therapy itself remains the same.

### Cardiac pacemakers (K60 and K61)

A pacemaking system has a pulse generator (the actual pacemaker) and either one or two electrode leads. Pacemakers with one lead are called ‘single chamber pacemakers’. The lead is either connected to the right atrium or right ventricle. Pacemakers with two leads are ‘dual chamber pacemakers’ and each lead is connected to the right atrium and right ventricle. Biventricular pacemakers use a third lead. When the atrium senses and contracts, both ventricles are paced to contract at the same time causing the walls of the left ventricle (the septal and free walls) to contract "in synch." The end result is improved cardiac function.

The pacemaker has two parts: the power supply, or batteries, and the electronic circuitry. It is completely covered in metal and sealed to prevent body fluids leaking into the unit. The whole pacemaker weighs only about 20-50g (1-2 ounces) and is smaller than a matchbox. Most pacemakers are powered by lithium batteries. Pacemakers last on average between six and ten years before they need to be replaced.

### Cardiac pacemaker (sutureless screw-in type) using direct surgical approach

The direct surgical approach is primarily employed for patients in whom the intravenous route has not been satisfactory, because of pulmonary hypertension, dilated atrium or ventricle, endocardial fibrosis or tricuspid regurgitation. A sutureless ‘screw-in’ myocardial electrode is secured in the myocardium using one of three approaches.

### Percutaneous transluminal intermittent occlusion of coronary sinus (K62.6)\*

Intermittent occlusion of the coronary sinus is a percutaneous coronary intervention (PCI) performed as an adjunct to coronary artery stenting during treatment of acute myocardial infarction. It consists of a balloon tipped catheter that is inserted into a stable position in the coronary sinus, the balloon at the tip of the catheter will inflate and deflate cyclically. These cycles are controlled by the console and is synchronized to inputs from the patient's ECG and coronary sinus pressure readings. When the balloon inflates, the occlusion of the coronary sinus venous outflow will induce a significant increase in back-pressure in the venous myocardial circulation. This forces the redistribution of blood-flow from normally perfused areas to deprived myocardium around the areas at risk, reducing the size of the infarcted area. Whilst this is running the clinician can deploy a stent in the pre-ballooned coronary artery lesion.

### Angiocardiography (K63.1, K63.2 and K63.3)

Angiocardiographyis a diagnostic test that shows the flow of blood through the heart and great vessels. This involves a contrast medium being introduced through a catheter (cardiac catheterisation) into the chambers of the heart. These can also be referred to as heart studies. The test can be performed on the right, left or both sides of the heart. An example of a left heart study is a left ventriculography; this involves injecting contrast into the left ventricle during x-ray imaging. Left ventriculography is sometimes performed in addition to a coronary arteriography but is rarely performed in isolation.

Right heart studies are almost always just the measurement of pressure within the heart, though sometimes imaging is performed using contrast. Right heart studies can be performed alone, or with a left heart study and/or left ventriculography.

### Coronary arteriography (K63.4, K63.5 and K63.6)

This involves taking images of the inside (lumen) of the two coronary arteries by injecting contrast during x-ray imaging. Usually two catheters are used, one for the left and one for the right coronary artery. It is not uncommon for more than one catheter to be needed to engage a coronary artery, and occasionally both can be imaged with only one catheter.

### Measurement of Fractional Flow Reserve (FFR)

Also referred to as pressure wire studies, these are performed to assess the functional significance of a coronary stenosis. It is performed using a pressure wire which is a modified angioplasty guidewire, positioned in the coronary artery via an angioplasty guiding catheter. The wire measures the coronary artery pressure proximal and distal to a stenosis while a state of myocardial vasculature dilatation is induced by giving intravenous or intracoronary adenosine. The measurement of Fractional Flow Reserve (FFR) has been shown to be useful in assessing whether or not to perform percutaneous coronary intervention (PCI) on "intermediate" blockages.

## Chapter L Arteries and veins (L01-L99, O01-O05, O15, O20)

### Injection of glue into varicose vein of leg (L86.3)

Glue is injected into the affected vein via a special tube inserted at the top of the saphenous vein, usually using ultrasound guidance. The glue is delivered through the catheter to seal the vein. The glue aims to close the varicose veins by adherence of the lumen.

### Placement of doppler ultrasound probe into microvascular vessel anastomosis (L98.6)

This is the implantation of a Doppler probe as an adjunctive surgical procedure that allows ongoing bedside monitoring of blood flow through vascular anastomoses, typically following free tissue flap surgical procedures. Microvascular free transfer is performed on patients in the reconstruction of defects consequent upon cancer ablation, congenital defects, and trauma. This procedure involves moving tissue from one part of the body to another to restore form or function (an auto-transplant). The tissue can comprise skin, fascias, muscle, tendons, nerves and bone. With a free microvascular graft, the tissue is harvested with its own artery and veins. These vessels from the flap are connected (anastomosed) to the recipient site to re-establish blood flow. Survival of the flap is critical to successful outcome: however, on occasion the vessels thrombose or kink, thus leading to flap failure. Flap failure needs to be detected early if the situation is to be corrected (salvaged). Flap monitoring can be clinical, but this method can fail to detect earlier problems and is not appropriate for bone or buried flaps. This code also classifies an implantable Doppler probe positioned on the artery, vein, or both at the time of surgery for monitoring blood flow.

### Endovascular placement of stent graft (O20)

Unfortunately, not all AAAs can be treated with commercially available stent grafts. The anatomic location of aneurysm contraindicates the use of a stent graft in more than 30 percent of cases. For instance, it is impossible to use a standard stent graft for an aneurysm located too close to the renal arteries, because there is not a long enough segment of normal aorta to secure the stent graft below the arterial branches. Securing it above would block the renal arteries and result in kidney failure. Up to now, these juxtarenal AAAs could only be treated with standard open surgery. A new treatment of juxtarenal AAAs is a fenestrated stent graft (**O20.2**), which can be secured to the walls of the aorta exactly where the renal arteries exit. This is possible because these stents have small windows, or fenestrations, that allow blood to pass into the renal arteries. The fenestrated stent graft is carefully positioned within the aorta, aligning the fenestrations with the renal artery openings. Smaller stents are then threaded into the renal arteries in order to permanently fix the position of the aortic stent graft. Branched stent grafts (**O20.1**) are a specific type of graft which is different to a 'standard' stent graft because it has branches to accommodate arteries which connect into the stent.

## Chapter M Urinary (M01-M86)

### Endoscopic cryoablation of lesion of kidney (M10.4)

This procedure is used in the treatment of renal cell carcinoma (RCC) as a minimally invasive, nephron-sparing alternative to open or laparoscopic partial nephrectomy. Cryoablation is a method of in situ tumour ablation performed by inserting a probe into the tumour to deliver a coolant at subfreezing temperatures. Cell death is caused by direct freezing, cell dehydration and ischaemic hypoxia.

### Endoscopic endoluminal balloon rupture of stenosis of pelvi-ureteric junction of kidney (ENDOBRST) (M10.5)

Balloon dilation represents a safe and simpler technique for treatment of ureteropelvic junction (UPJ) obstruction and ureteral stricture. This procedure can be found in Section III of the OPCS-4 Alphabetical Index (page 203) which includes a direct reference to the correct code. Endobrst can also be performed on the ureter (**M27.6**) so care must be taken when indexing.

### Percutaneous pyeloureterodynamics (M12.1)

Also known as a ‘**Whitaker** **test**’ this procedure involves the percutaneous insertion of a cannula into the renal pelvis with perfusion of contrast at a rate of 10ml/minute, and simultaneous recording of pressure in the renal pelvis and bladder to identify the presence of obstruction in doubtful cases.

### Creation of ileal conduit (M19.1)

An ileal conduit is performed to create a urinary diversion. A section of distal bowel is excised with its blood supply intact to serve as a false bladder following a cystectomy (excision of urinary bladder).

### Mitrofanoff urinary diversion (M19.1-M19.2, M24.5-M24.7)

A Mitrofanoff (or continent catheterisable channel) is a tube created from the appendix or small intestine, which connects the bladder to the surface of the skin. It is tunnelled into the bladder in such a way that a 'valve' is created, which prevents urine leakage. The catheter is not left in place permanently.

A Mitrofanoff channel is often constructed simultaneously with other forms of lower urinary tract reconstructions such as neobladder, in order to allow continent storage of urine.

### Orthotopic bladder substitute using intestine (M19.7)

Following a cystectomy, the orthotopic bladder substitute using intestine, also known as a neobladder, is constructed from intestine and placed where the bladder would normally be (orthotopic). Surgeons cut about 3 feet of ileum or other parts of bowel (small or large) with the blood supply still attached then incise and refold it to create a pouch. Anastomosis of any remaining bowel is an integral part of the operation. The new pouch is re-attached to the remnant of the urethra. Without the remnant of the urethra to attach the neobladder to, it is not possible to perform this operation.

### Continent urinary diversion (M24.1-M24.5)

A continent catheterisable intestinal pouch is a method of urinary reconstruction following cystectomy. It is formed by incorporating segments of small intestine or appendix into the urinary tract to create a urinary reservoir with ureteric implantation.

When the urethra cannot be used for catheterisation of the intestinal pouch a continent cutaneous urinary diversion is created, which also involves the creation of a continent cystostomy.

### Closure of exstrophy (M37.4)

Surgery to repair the defect is usually performed within the first 48 hours after birth. The first surgery needed is to separate the exposed bladder from the abdominal wall and close the bladder (bladder repair). The bladder neck and urethra are repaired. A flexible catheter is left in to drain the urine from the bladder through the abdominal wall. A second catheter is left in the urethra to promote healing. Because the pelvic bones are separated, the child will also need to have the pelvic bones surgically attached to each other. After this surgery, the child will need to be in a lower body cast or sling to promote healing of the bones. This surgery may be done with the first surgery, or it may be delayed for weeks or months.

### Suprapubic aspiration of bladder (M48.1)

This is commonly undertaken on children to obtain a direct sample of urine either to ensure it is sterile, or to diagnose a urinary tract infection (UTI). This procedure is less commonly performed on adults.

### High intensity focused ultrasound of bladder (HIFU) (M49.7)

HIFU uses pinpointed sonic waves to create high temperatures that ablate tumour cells. The sound waves cannot pass through air or bone and act in a localised area. It is a fairly safe technique as it does not affect surrounding tissue. HIFU of the ***prostate*** is classified at code **M71.1**.

### Insertion of tension free vaginal tape (TVT, Retropubic tape) (M53.3, M53.4 and M53.5)

Tension free vaginal tape is a minimally invasive midurethral sling that is passed through the retropubic space. The surgeon makes a small incision inside the vagina just under the urethra. The surgeon also makes two small openings above the pubic bone just large enough for a needle to pass through. The surgeon then uses a needle to pass the sling under the urethra and up behind the pubic bone. A few absorbable stitches close the vaginal incision, and the needle sites may be sealed with skin glue or stitches.

### Single incision mini slings (SIMS) (M57.1, M57.2, and M57.3)

The single-incision short/mini slings have shorter tape lengths and different fixation systems to minimally-invasive slings (TVT, retropubic tape). The sling is inserted using a delivery needle through the obturator foramen and retracted to deploy the sling into the obturator internus muscle. This is repeated with a second sling on the contralateral side. A special tip anchors the sling in place behind the mid urethra. Sling tension is then controlled using the delivery device until the appropriate tension is achieved.

### Insertion of retropubic device for female stress urinary incontinence NEC and Insertion of male retropubic continence device NEC (M55.6 and M60.1)

Adjustable continence therapy (ACT) is classified here. This approach for treating female and male stress incontinence consists of an implantable, inflatable balloon connected to a subcutaneous filling port. ACT systems are fully implantable and can be post-operatively adjusted by the clinician through the skin with a hypodermic needle to add or subtract fluid from the balloon via the subcutaneous port to maintain continence for the patient. The volume of fluid in the balloon can be adjusted in either the short or long term and is based upon the individual patient’s needs. These devices are also referred to as extraurethral (non-circumferential) retropubic adjustable compression devices.

### Vapotrode TURP (M65.5)

Transurethral vaporisation of the prostate is sometimes referred to as Vapotrode TURP. This is an electrosurgical treatment for BPH, as an alternative to TURP. It uses a destruction technique called transurethral electrovaporisation (EVAP) and combines the use of high electrical power with special developed EVAP-elements to vaporise the prostate.

### Endoscopic Insertion of prosthesis to compress lobe of prostate (M68.3)

This procedure is to compress/lift enlarged prostate glands that are pressing on the prostatic urethra causing problems passing urine. A pre-loaded delivery device is passed through a rigid sheath endoscopically. The delivery device is used to compress one lateral lobe of the prostate in an anterolateral direction towards the prostate capsule. A needle is then advanced through the lobe and capsule and an implant with two end pieces is deployed. One end is anchored in the urethra and the other on the outer surface of the prostatic capsule, retracting the prostatic lobe away from the urethral lumen. Multiple implants can be inserted during the procedure.

## Chapter P Lower female genital tract (P01-P32)

### Vaginoplasty using olive (P21.5)

An ‘olive’ is a plastic bead through which traction sutures or threads are threaded. The traction sutures run through the abdominal cavity to a traction device placed on the outside of the abdomen. The vagina lengthens to about 8–12 cm by gradually increasing the tension on the traction sutures. This procedure can also be referred to as a ‘***Vecchietti***’procedure.

## Chapter Q Upper female genital tract (Q01-Q58)

### Endoscopic bilateral placement of intrafallopian implants (Q35.4) and Endoscopic placement of intrafallopian implant into remaining solitary fallopian tube (Q36.2)

Small, flexible titanium micro insert are passed through a hysteroscope, via the vagina and cervix, and placed into the fallopian tube(s) using a guidewire. The micro inserts induce scar tissue formation, which occludes the fallopian tubes and prevents conception. After 3 months, imaging (such as hysterosalpingogram [HSG] or X-ray) is obtained to confirm correct placement of the micro inserts and to check that the fallopian tubes have become occluded.

### Insertion of osmotic dilators (Q05.3) and mechanical induction of labour (R15.2)\*

Osmotic dilators, such as Dilapan-S® rods, are small synthetic gel rods which are inserted into the cervix and gradually increase in volume over a period of 12-15 hours by absorbing fluids from the cervical canal. The rods are around 4mm in diameter upon insertion and can expand by up to 14mm over a 24-hour period, thereby dilating and softening the cervix. This is also referred to as cervical priming.

Osmotic dilators may be used for induction of labour or to prepare the cervix prior to a termination of pregnancy, these are not hormonal or abortifacient devices.

## Chapter R Female genital tract associated with pregnancy, childbirth and the puerperium (R01-R43)

### Surgical induction of labour (R14)

The Royal College of Obstetricians and Gynaecologists confirmed it is only possible to perform an artificial forewater rupture of membranes. Some patients attend hospital with evidence of ruptured membranes, but when they are examined, the forewaters are felt, a diagnosis of hindwater rupture of membranes is made. Hindwater rupture of membranes occurs spontaneously and is not performed artificially.

### Normal delivery (R24)

The process of giving birth without mechanical intervention with a vertex (top of the head) presentation.

### Deinfibulation of vulva to facilitate delivery (R27.2)

Deinfibulation is a surgical technique to reverse the closure of the vaginal opening after infibulation (female genital mutilation). It consists of a vertical cut opening up normal access to the vagina which can be accompanied by removal of scar tissue and labial repair. Some women are reluctant to undergo reversal until labour commences because this may be normal practice in their country of origin. Deinfibulation carried out to facilitate delivery is usually performed during the first stage of labour.

## Chapter S Skin (S01-S70)

### Skin flap procedures

A skin flap is transferred (harvested) from one site to another while maintaining its own blood supply.

Distant tissue flaps, which may include skin, muscle, bone, fat, or fascia, are either *pedicle* flaps or *free* flaps. A pedicle flap is partially detached from the donor site and inserted into its new position while temporarily retaining its blood supply from the original source. This is detached later. A free flap is completely detached from the original blood supply and reattached to vessels at the recipient site.

Local flaps have their donor areas touching at the borders or very near to the recipient site. They can be *rotational* (i.e. the tissue is rotated in an axis over the wound site and stitched down) or *transpositional* (i.e. the tissue is moved across at an angle to reach the recipient site, leaving a small surface wound on the opposite side to the original wound. This can be grafted later).

Axial pattern and random pattern refer to the blood supply of the flap. If the blood supply comes from many unnamed blood vessels, the flap is referred to as a random pattern flap. If the blood supply comes from a recognised artery or group of arteries, it is referred to as an axial pattern flap.

A skin graft is a piece of skin transferred from one location to another. It does not have vascular attachments and contains skin and subcutaneous tissue.

### Wide excision of lesion of skin (S06.5, S06.9)\*

Wide local excision (WLE)/ Wide excision involves the removal of an abnormal lesion and a small margin of healthy tissue around it, usually in an ellipse shape, with the aim of ensuring no abnormal cells remain.

WLE/ Wide excision is often used for basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) on lower risk body sites (such as the body or arms/legs), and for early-stage melanomas, that are still confined to the skin and have not spread into deep levels of tissue or other parts of the body.

### Wider excision of skin margins (S06.6, S06.7)\*

If, following excision, the pathology result confirms that the margins also contain malignant cells, a “re-excision’ or “wider excision” may be performed. This involves re-opening the original excision site to remove an additional margin of tissue and can also be referred to as “clearing the margins.”

### Delayed primary suture of skin (S41.2, S42.2)

This type of suture is where wound closure is undertaken a few days after injury when risk of contamination or infection has passed, or when the wound would be under too much tension if closed immediately after injury.

### Secondary suture of skin (S41.3, S42.3)

The repair of a wound, some of which has been initially sutured, but the rest has been allowed to remain open until partially healed and covered in healthy granulations.

### Dermal substitutes (S53.7)

Dermal substitutes are used to replace the dermal layer of the skin, they act as matrices or scaffolds to enhance wound healing and promote the growth of new tissue. These are often used in combination with skin grafts.

## **Debridement of skin and wounds (S56.1 and S57.1)\***

Debridement of skin and wounds involves gentle handling of the tissues to minimise bleeding, excising any dead or devitalised tissue and removing any foreign matter that may be present within the wound. It is sometimes referred to as ‘trimming of edges.’

### Washout/Toilet of skin and wounds (S56.3 and S57.3)\*

Toilet of skin and wounds involves cleaning with antiseptics and irrigating with saline. It removes dead cells, pathogens, and excess blood or other exudates such as pus in an open wound and assists with a better visual examination. Other terms used for a toilet of skin/wound include ‘washout’ and ‘irrigation’ of skin/wound.

## Chapter T Soft tissue (T01-T98)

### Reconstruction of anterior abdominal wall (T32)

This is carried out when the muscles and tissues that support the abdomen are destroyed, typically due to the sequelae of wound breakdown and infection following previous surgery, e.g. bowel surgery. This type of reconstruction can also be required following surgery for the removal of cancers, the correction of birth defects and following trauma. The damaged tissue is removed, and healthy tissue is brought into the area using surgical techniques, such as local flaps, tissue advancement and if necessary, skin grafts. In addition, supporting materials such as artificial mesh material can be used when muscle has been lost.

### Tendon repair procedures (T66, T67, T68, T73, T75 and T78) \*

Tendon repair procedures require the utilisation of different surgical techniques and materials depending upon the timing of the procedure. While there are variations in the definitions of types and timings of tendon repair, the guidelines provided by the British Society for Surgery of the Hand (BSSH) are as follows:

* Primary repair – initial repair typically within 4 days of injury
* Delayed primary repair – initial repair, typically 5 or more days after injury
* Secondary repair – re-repair following a rupture or other failure of the primary repair

### Catheter manometry of muscle compartment (T83.5)

In this technique, a catheter is inserted through the skin and into the muscle tissue to measure the pressure in situ. It is used in the diagnosis of compartment syndrome, a condition commonly affecting the limbs in which the circulation and function of tissues within a closed space is compromised by an increase in pressure within that space.

## Chapter U Diagnostic Imaging, Testing & Rehabilitation (U01-U54)

### Cardiac computed tomography for calcium scoring and cardiac computed tomography angiography (U10.2)

A coronary calcium scan is a non-enhanced ECG-synchronized scan for the detection and quantification of coronary calcium which frequently proceeds to a coronary CT angiography (CTA). A coronary CTA refers to the use of contrast-enhanced cardiac CT specifically for imaging the coronary arteries and is performed whilst the patient is still in the scanner.

### Insulin secretion glucagon test (U29.2)

This test is done by giving glucagon to measure endogenous insulin production. Glucagon may also be given to measure anterior pituitary function, but this is more resource intensive and is an unrelated procedure.

## Chapter V Bones and joints of skull and spine (V01-V70)

### Strip craniectomy (V01.6)

Strip craniectomy is performed when the cranial sutures fuse too quickly in children and cause the skull to distort. The procedure involves the removal of a cranial suture and a strip of bone either side of the suture. Strip craniectomy may be performed on the metopic, coronal, lambdoid or sagittal sutures.

### Strip craniectomy with remodelling of cranial bones HFQ (V01.7)

In addition to the removal of a cranial suture and a strip of bone either side of the suture the bones of the cranium are removed and then remodelled as appropriate to correct the distorted shape of the skull using techniques such as barrel-staving, pi-extension and plication. In some cases, distractors or springs may be inserted.

### Posterior calvarial release (V02.1)

During posterior calvarial release the back of the skull is cut and partially or totally released from the dura underneath. This releases the pressure caused by the growing brain. Distractors or springs may be placed. This procedure is usually the first stage of a staged procedure with the patient preceding to have a more substantial remodelling later as a second stage.

### Remodelling of calvarium HFQ (V02.2)

Calvarial remodelling and/or expansion may be total, subtotal or posterior. The extent is indicated by the bones that have been remodelled:

* Total – involves the lateral, central, frontal, occipital, anterior and posterior calvarium
* Subtotal - involves the lateral, central, frontal and occipital calvarium
* Posterior - involves the posterior calvarium

The procedures involve cutting away areas of bone from the skull, re-shaping them, and replacing them in positions that will improve space and shape. The remodelling may be done using barrel-staving, melon-slicing, rotation, swapping or splitting the bones.

### Transpetrous excision of lesion of jugular foramen (V05.6)

A transpetrous approach is one through the petrous portion of the temporal bone. The petrous portion of the temporal bone roughly assumes the configuration of a four-sided pyramid. Within the body of the petrous bone are found the labyrinth and internal carotid artery, cranial nerve vii and cranial nerve viii, which all penetrate the bone substance.

### Osteotomy of bones of face and translocation of orbit (V10.6)

This procedure is also referred to as a box osteotomy/orbital translocation and is performed to correct increased distance between the eyes. Osteotomies are done around the whole of the orbit in the shape of a box mobilising the orbit and allowing the surgeon to move the orbits into the desired position. Additional bone may be removed to allow the bones to be located in the correct position. The bones are fixed in their new position using wires or plates and bone grafts are applied to fill any defects.

### Subcranial U-osteotomy of bones of face and translocation of orbit (V10.7)

Subcranial U-osteotomy (subcranial translocation of orbit) is a similar procedure to a box osteotomy. Osteotomies of a three-sided box are cut around the orbit leaving the top edge of the box attached to the face. A central segment of the nasal bones may be removed in addition to excessive soft tissue, cartilage or sinuses. The orbits are then moved towards the middle of the face bringing the orbits closer together. The bones are fixed using plates or wires and canthopexies are performed to secure the canthus in the new position.

### Advancement and remodelling of cranium and orbits HFQ (V12.1)

This code includes fronto-orbital advancement and/or remodelling. The bones of the forehead are separated from the skull as well as those around the eye socket and are advanced forward.

### Advancement and remodelling of cranium and facial bones HFQ (V12.2)

This procedure may be referred to as monobloc fronto-facial advancement and or remodelling or split-level fronto-facial advancement and/or remodelling. The procedure involves mobilisation of the cranium and facial bones in order to move the bones forward of their existing position. Distractors are placed to hold the bones in the new position.

### Bipartition of facial bones and maxilla (V13.4)

During a facial bipartition a wedge of bone is taken above the nose between the orbits. Osteotomies are performed along the cranium and sides of the orbits, the maxilla is separated and the orbits are rotated towards each other into the space where the wedge of bone was taken from. Bone fragments of grafts are used to fill the defects on the side of the face. Where advancement is also performed distractors are inserted.

### Distraction osteogenesis of bones of skull (V18)

Distraction osteogenesis moves two segments of a cut bone slowly apart allowing new bone to fill in the gap. A cut is made into the relevant bones so as to detach a particular part of the skull or face and allow it to be repositioned. Once the repositioning and fixation have been done, a distractor is fitted, either internally or externally. Over the next few weeks, the screws on this are turned each day, widening the gap between the two cut parts of bone. Bone grows naturally to fill in the gap, giving the affected part the desired shape. The distractor is then removed. Spring assistance is a type of internal distraction, the spring is inserted to hold the bones apart.

### Corpectomy

A corpectomy is the excision of a vertebra and its adjacent intervertebral discs for decompression of the spinal cord and spinal nerves and is usually combined with interposition of prosthesis or bone graft. A bone graft with or without a metal plate and screws is used to reconstruct the spine and provide stability.

### Spinal fusion

There are several types of spinal fusions that can use bone graft and instrumentation. Spinal instrumentation involves the use of an implant system which can be made from titanium, titanium-alloy, stainless steel, or non-metallic devices into the spine. Spinal instrumentation provides permanent spinal stability while facilitating the process of fusion. Implants are specifically designed and come in many shapes and sizes. These typically include rods, hooks, braided cable, plates, screws and interbody cages. Cages are simply structures that support bones (either between bones or in place of them) whilst new bone growth occurs through and around them.

### Epiphysiodesis (V42)

This procedure is used to correct congenital deformities of the spine such as kyphosis and scoliosis. Epiphysiodesis and arthrodesis are performed anteriorly, posteriorly or using both anterior and posterior correction on the convex side of the spine. This allows growth on the concave side of the spine.

### Primary posterior lumbar medial facetectomy (V67.1)

This is an operation on the facet joints which are located on the back of the spinal column. There are two facet joints between each pair of vertebrae, one on each side of the spine. A facet joint is made of small, bony knobs that line up along the back of the spine. Where these knobs meet, they form a joint that connects the two vertebrae. The alignment of the facet joints of the lumbar spine allows freedom of movement to bend forward and back. A laminectomy (removing the spinous process and bilateral lamina) and removal of the underlying ligamentum flavum, exposes and decompresses the cauda equina in the central thecal sac. Extension of bony removal to include up to 1/3 of the medial aspect of the facet joint (thus maintaining stability) will additionally expose and decompress the transiting nerve root in the lateral recess. Performed alone and unilaterally, this latter decompression is often called a medial facetectomy.

## Chapter W Other bones and joints (W01-W99, O06-O10, O17-O19, O21-O27, O29, O32, O35, O37-O41, O49, O51)

### Cuneiform osteotomy of proximal phalanx with resection of head of first metatarsal (W15.6)

The term ‘cuneiform’ means wedge shaped.This procedure is also called an ‘Akins’ osteotomy. Akin first proposed osteotomy of the hallux for correction of hallux valgus in 1925. Since then, however, many other methods of osteotomy (combined with other soft tissue and fixation procedures) have been developed as alternative treatments for hallux valgus.

### Kirschner wires (K-wires)

These are steel wires frequently used to hold fragments of bone in position in the treatment of bone fractures. Medical documentation and procedure notes do not usually clarify whether K-wire fixation should be classified as a rigid or flexible form of internal fixation.

In the term “flexible fixation”, the word flexible means that the implant can adapt to a path by changing direction without damage to the internal structure. Kirschner wires (K-wires) may be bent, and whilst this changes the internal properties of the K-wire, this is not because it is flexible, but because force has been applied. K-wire fixation is always a form of **rigid fixation.**

### Application of external ring fixation to bone NEC (W30.4)

An external fixator for adjustably securing first and second portions of a bone includes a ring assembly and a bone screw clamp assembly interconnected by a central body. The ring assembly secures one or more tension wires adapted to pass through the first portion of the bone. The bone screw clamp assembly secures one or more bone screws adapted to engage a second portion of the bone. The ring assembly includes a generally circular frame having a peripheral groove for securing a tension wire carriage. The tension wire carriages are adjustable so that the tension wire may be positioned above or below the ring. One or more connector rods are used to rigidify the external fixator by interconnecting the ring assembly and the bone screw clamp assembly.

### Tension band wiring (TBW)

Tension band wiring is similar, regardless of where it’s performed. A transverse hole (going across) is drilled through the metaphyseal or diaphyseal cortex of the bone. The fracture is reduced and two small Steinmann pins or ‘K’ wires are driven across the fracture line. The wire is applied as a loop to the outer side of the fracture so that it comes under tension when the joint is flexed. This procedure is particularly used for fractures of olecranon (elbow) and patella. Tension band wiring will always be undertaken as an open reduction.

In tension band wiring it is the wiring that allows the fracture to be held together. Tension band wiring is an extramedullary fixation as the fixation (the wires) does not lie within the medulla of the bone. The term *‘cerclage’* in OPCS-4 means, by simple definition, encircling with a loop for fixation of adjacent ends of a fractured bone.

### Total hip replacements using grafts

During most total hip replacement procedures, bone chippings produced from bone reamed from the patient’s femur are used to **pack and secure** a prosthetic joint replacement, providing additional stability of the joint implant.

However, in other types of total hip replacements, and where there is evidence documented of extensive acetabular bone loss, an acetabular **bone graft**, using either morcellised bone or bone block, will be performed in addition to the total hip replacement. The acetabular bone graft is considered to be in addition to the joint replacement procedure.

### Hybrid joint replacements

A hybrid joint replacement is also known as a partially cemented total joint replacement as only one component of the prosthetic joint has been cemented, e.g. femoral stem or acetabulum. In hybrid knee replacement surgery, the tibial component is cemented with an uncemented femoral component.

### Unicompartmental knee replacement

Unicompartmental knee replacement is a form of resurfacing arthroplasty which replaces the surfaces of the patellofemoral or tibiofemoral joint in the knee. ‘Unicompartmental’ is used as the preferred term rather than ‘unicondylar’ knee replacement. Because both bones receive replacement of their surfaces, it cannot be classified as a Hemiarthroplasty, which replaces one bone within a joint.

### Resurfacing hemiarthroplasty

Joint resurfacing is an alternative to total joint replacement surgery. It is a surgical procedure that allows patients to retain much of their natural tissue, by replacing only the diseased part of the joint instead of the entire joint. This gradual approach to surgery means the patient may still be able to have a total joint replacement later if necessary.

### Ozaki Procedure (W76.1)

An Ozaki Procedure is an operation carried out for frozen shoulder. This is a resection of the coraco-humeral ligament and local inflammatory tissue from the region of the rotator interval. Though this can be performed as an open procedure, it is now more commonly carried out arthroscopically.

### Endoscopic articular abrasion chondroplasty (W83.4)

This is carried out where articular surface (articular cartilage) has been damaged to such an extent that the underlying bone is exposed. This may be treated by a superficial abrasion of the bone surface by a rotatory 4.5mm burr. This produces a bleeding surface, which over the next six weeks often forms a surface layer of scar tissue, which acts as a substitute for the original articular cartilage.

### Endoscopic articular thermal chondroplasty (W83.5)

The procedure is performed using an arthroscopic approach and is carried out to treat intraarticular lesions. The lesion is debrided, a thermal probe is then introduced onto the lesion and thermal energy is passed through the probe fusing the tissue.

### Endoscopic decompression of joint (W84.4)

A common example of a site treated with endoscopic (arthroscopic) decompression is the acromioclavicular joint or ACJ. It is situated at the outer end of the collarbone. As the ACJ is relatively stiff, it is subjected to high forces. This results in overuse injury and may progress to ACJ arthritis. In advanced arthritis, surgical decompression of the joint will bring relief to the patient. The surgery is done arthroscopically and involves shaving 1cm to 1.5cm of the outer end of the collarbone.

### Endoscopic repair of superior labrum anterior to posterior tear (W84.7)

Thisis also known as a repair of a SLAP tear. The labrum is not a tendon or muscle but fibrocartilage, and is situated at the top of the shoulder (between 11 and 1 o'clock positions). The biceps tendon is attached to the superior labrum at this site. SLAP tears are always repaired arthroscopically. The key difference between this procedure and **O27.2 Repair of capsule and anterior and posterior labrum for stabilisation of glenohumeral joint** is the position of the tear. In both cases anchors are introduced into the bone and then sutures are attached to the anchors to repair the tears.

### Aspiration of prosthetic joint (W90.1)

A joint aspiration may be performed for either therapeutic or diagnostic purposes. A sterile needle with an attached syringe is inserted within the joint cavity and fluid is then aspirated into the syringe.

### Endoscopic autologous matrix induced chondrogenesis of joint (O19.1)

Autologous matrix induced chondrogenesis (AMIC) is a biological cartilage repair method. This innovative technique uses the body’s own healing potential and the regenerative capacity of mesenchymal stem cells. It can be applied to cartilage defects that extend full thickness down to the subchondral bone and are bigger than 1–2 cm². The shortcoming with microfracture is that it only appears to be able to regenerate fibrocartilage, and not hyaline cartilage which is much stiffer and more resistant to shear forces. AMIC differs from microfracture in that a cover, in the form of a collagen matrix, is applied over the defect immediately following microfracture. This cover then traps the first few millilitres of bone marrow bleeding which contain the highest percentage of mesenchymal stem cells to form a so-called ‘Superclot’. In so doing the first and most important clot is kept in place, and not lost into the joint as so often happens with microfracture. The collagen matrix forms the roof of a biological chamber and serves to protect and contain the stem cells as they differentiate into chondrocytes, which will form a healthy regenerative cartilage.

### Repair of capsule and labrum for stabilisation of glenohumeral joint (O27.2–O27.4)

These procedures are usually performed for a shoulder dislocation or instability which may cause damage to the labrum. In anterior dislocation, the anterior labrum is damaged and in posterior dislocation, the posterior labrum is damaged. In some cases, both will be damaged. In addition, the capsule is also damaged or stretched. A stabilisation operation consists of repairing the labrum and tightening the capsule.

The procedures classified at codes **O27.3** and **O27.4** are also known as simple repairs (unidirectional), whilst **O27.2** is known as a complex repair (multidirectional) as it involves repair of both the anterior and posterior labrum.

### Subacromial decompression (O29.1)

This is also known as an ‘acromioplasty’ or ‘shoulder decompression’. It is often seen abbreviated as SAD, or ASD if arthroscopic. It involves releasing the ligament from the front of the acromion and trimming/debriding the undersurface of the acromion. As the release and trimming are both usual components of the procedure, they do not require coding in addition. The goal of surgery is to increase the space between the acromion and the rotator cuff tendons. This space is known as the ‘subacromial space’ which is not a true joint. The surgeon must first remove any bone spurs (osteophytes) under the acromion that are rubbing on the rotator cuff tendons and the bursa. Usually, the surgeon also removes a small part of the acromion to give the tendons even more space.

Subacromial decompression can take place with or without excision of the acromioclavicular joint (ACJ). If the ACJ is arthritic, it may be decompressed, i.e. excised. This procedure may involve removing the end of the clavicle, bone spurs from the inferior surface of the AC joint and part of the medial end of the acromion. Scar tissue then fills the space left between the clavicle and the acromion, forming a false joint. The idea is to stop the pain caused by bone rubbing against bone. The scar tissue creates a stable, flexible connection between the clavicle and the scapula. Acromioclavicular joint excision can also be described as AC joint decompression, excision of the lateral end of the clavicle, or simply abbreviated to ACJD.

## Chapter X Miscellaneous operations (X01-X98)

### Pelvic side wall clearance (X14.4)

This involves laparotomy, dissection and mobilisation of healthy organs as appropriate to give access to the site of the tumour, and resection of the pelvic wall and any related tissues (retroperitoneum, artery and vein branches, muscle, lymphatic tissue, pelvic side wall muscles, periosteum and pelvic bones, etc), which are all considered to be part of the procedure. When pelvic organs are removed this is considered an exenteration of the pelvis.

### Other intravenous injection (X35)

A drug administration by intravenous **bolus** is considered to be a rapid administration of a drug by **injection** and not a continuous infusion, it can be through a peripheral intravenous line, directly into a vein, or through a vascular access port. The procedure involves the administrator standing by the patient and injecting the substance/drug through a syringe to deliver the medication, usually over a short period of time. This differs from an intravenous infusion **(X29.2)** which is not clinically a bolus**,** the administrator can set up the infusion apparatus and then leave the patient for a period of time while the drug/medication is being administered.

### Venous sampling (X36.3)

A sample of blood is taken from a certain vein, such as jugular or portal veins, and checked for specific substances released by nearby organs and tissues.

### Haemoperfusion (X40.7)

This uses an exchange resin or charcoal in an absorbent column through which the blood passes. No membrane or dialysate is used. Wastes and toxins in the blood stick to the resin or charcoal in the column and the cleansed blood passes through. It does not remove water. Unfortunately, platelets can also adhere to the column which is not reusable and must be discarded. This procedure is mainly used in poisoning cases or as an adjunct to haemodialysis.

### Evaluation of cardioverter defibrillator (X50.5)

Internal cardioverter defibrillators (ICD) are tested to ensure they are functioning correctly by inducing ventricular fibrillation (VF) in the patient. A small device is placed on the chest, over the area where the ICD was inserted. The ICD is programmed to irritate the heart muscle so that it goes into VF (a dangerous heart rhythm). The ICD should then recognise the abnormal heart rhythm and shock the heart so that the normal rhythm returns

### Delivery of radionuclide therapy NEC (X65.7)

Radionuclide/ radioisotope therapy is a type of radiotherapy which entails the use of unsealed radioisotopes administered orally, intravenously or intra-arterially to deliver a therapeutic dose of radiation to treat a specific disease or part of the body. Treated diseases include metastatic liver disease, neuroendocrine tumours, Non-Hodgkin’s lymphoma and polycythaemia.

It is a form of targeted therapy; targeting can be due to the chemical properties of the isotope where the isotope is specifically absorbed by a certain organ in the body. Targeting can also be achieved by attaching the radioisotope to another molecule or antibody to guide it to the target tissue. The radioisotope used, pharmaceutical attached to the isotope and the method of delivery varies depending on the treatment required. A number of radioisotopes are in use, they include Radioiodine capsule (I-131), Strontium (Sr-89), Phosphorus (P-32), Zevalin (Y-90), mIBG (I-131), Dotatate (Y-90) or Dotatoc (Y-90), Dotatate (Lu-177) and Alpharadin (Ra-223).

### Preparation for external beam radiotherapy (X67)

**Simple radiotherapy** is a standard technique with standard imaging and dosimetry. It would probably include techniques such as:

* Single direct field
* Parallel opposed (two fields opposite each other)
* 3-field technique (three individual fields all incident on the same tumour volume)
* 4-field Box (in effect two sets of parallel opposed fields incident on the same tumour volume).

These techniques are relatively easy to plan, and the dosimetry is straight-forward. Any deviations from this standard planning protocol may fall into the complex subcategory because they will be out of the norm, need more consideration and be more time consuming on the part of the dosimetrist.

**Complex radiotherapy** planning involves more complicated techniques requiring more time and thought from the dosimetrist, and will probably involve more detailed imaging and field placement:

* Intensity Modulated Radiotherapy (IMRT) for external radiotherapy only
* Conformal therapy techniques
* Hemi and Total Body Irradiation (TBI)
* Multi-phase techniques
* Probably all brachytherapy techniques, as the dosimetry involved is usually quite sophisticated.

### Radiotherapy delivery (X65 and X69)

**Stereotactic radiation therapy is a specialized type of external beam radiotherapy** and is divided into two types:

* Stereotactic radiosurgery (SRS), single or several stereotactic radiation treatments of the brain or spine
* Stereotactic body radiation therapy (SBRT), one or several stereotactic radiation treatments within the body (excluding brain or spine)

Stereotactic radiation may be delivered by a number of different devices/machines. Brand names should not be confused with the actual type of stereotactic radiation.

**High dose rate brachytherapy** is delivered through temporarily placed applicators in a shielded room. Multiple fractions may be given, and patients may attend the unit more than once in a day.

**Pulsed dose rate brachytherapy** is delivered through temporarily placed applicators; however, the radiation dose is given over many hours in short pulses. The patient will remain in a shielded room for the duration of the delivery.

**Intraoperative electron beam radiotherapy** is the direct application of electron beam radiotherapy to a tumour bed during an operative procedure in an operating theatre. It is typically used when the tumour site involves or is adjacent to structures which cannot be safely removed without substantial risk or morbidity to the patient, e.g. major blood vessels, important nerves or other healthy organs.

### Thrombolytic/fibrinolytic drugs

Thrombolytic/fibrinolytic drugs (i.e. alteplase, reteplase, streptokinase and tenecteplase) are used in the treatment of myocardial infarctions and ischaemic strokes to break down the thrombus causing a blockage in the artery so that the blood flow can be restored to prevent further damage and assist healing.

## Chapter Y Subsidiary Classification of Methods of Operation (Y01-Y99, O44, O48)

### Brachytherapy

Brachytherapy can be delivered by several means: ***intracavitary****,* ***interstitial*** *or* ***intraluminal****,* which all use radioactive implants to deliver doses of radiotherapy. These implants can be removable (**Y35**) or non-removable (**Y36**). A permanent implant of radioactive seeds, such as gold (**Y36.1**) is placed directly into the organ. Over several weeks or months, the seeds slowly deliver radiation to the tumour. More commonly used is the removable implant (**Y35**) where wires, tubes or seeds are placed directly into the tumour and stay in place for anything from a few hours to a few days. Modern methods tend to involve the insertion of Iridium-192 wire (**Y35.2**).

### Scaffolds and mesh (Y28, Y36.5, Y36.6 and Y36.7)

Surgical mesh is a thin woven material used to provide structural support to internal organs and tissues. The mesh allows tissue to grow around and into the mesh and can be made of synthetic, biological or composite material.

Scaffolds are implanted to aid in new tissue formation whilst providing stability to

the tissue defects. They can be degradable or non-degradable depending on their use.

Biological scaffolds use an allograft or xenograft (natural polymers) which stimulate new tissue growth. An acellular dermal matrix is a soft connective tissue graft that serves as a scaffold.

Synthetic scaffolds use a synthetic polymer to support new cell formation.

Composite scaffolds use a mixture of natural and synthetic polymers.

### Fluorescence cystoscopy / instillation of photodynamic substance (Y37.1)

Fluorescence cystoscopy or photodynamic diagnosis is used to diagnose bladder cancer and is also used for follow-up surveillance. It involves, in addition to existing cystoscopy-related codes, the administration of a photodynamic agent into the bladder one hour prior to operation and examining the bladder with blue light as well as the traditional white light in conventional cystoscopes.

### Tattooing of organ NOC (Y39.5)

During any endoscopy, lesions can be marked by tattooing them with ink. This serves no therapeutic purpose but is important in tagging lesions so they may be positively identified at a later date.

### Arteriotomy versus percutaneous approach

For patients undergoing an arterial intervention there are two types of approach that can be used, and each type of approach can be associated with image guidance.

An arteriotomy is a method of approach used to gain access to the inside of the artery by surgical incision (open approach). Most patients having an arteriotomy will have a treatment that does not require image guidance as the surgeon will have a direct view of the artery. However, some interventions, in particular stent-grafts for aneurysms, require incision away from the site of the procedure, and therefore require some form of image control to allow precise visualisation. Common terms which indicate an arteriotomy has been performed are; incision into artery, surgical cut-down or cutting of artery. The arteriotomy will always require suturing with either suture or clips to the overlying skin.

The majority of interventions that are undertaken on arteries by radiologists and some surgeons are referred to as interventional radiology procedures and are minimally invasive. These are usually undertaken by putting local anaesthetic in the skin and then passing a small needle and tube into the artery without a surgical incision. This is referred to as a percutaneous access and the intervention is classed as a ‘percutaneous transluminal’ procedure. Once inside the artery, the radiologist or surgeon needs a means of visualising the artery, and this is achieved by using image control.

### Contrast enhanced ultrasound (CEUS) (Y68.1)

This technique utilises intravenous or intradermally injected gas filled microbubble contrast agents to improve the visualization of organs and blood vessels using ultrasound.

### Intraoperative fluid monitoring (Y73.6)

Intra-operative fluid monitoring/management enables the closer monitoring and management of a patient’s hydration status during major high-risk surgery. One way of the ways of performing this is known as Intra-operative oesophageal Doppler monitoring. Oesophageal Doppler Monitoring (ODM) is a minimally invasive technology used by anaesthetists during surgery to assess cardiac output and intravascular fluid status of the patient and guide the safe administration of fluids and drugs. It is an alternative to invasive cardiovascular monitoring (such as central venous catheters or pulmonary artery catheter monitoring).

Oesophageal doppler monitoring is undertaken with a single-use probe, which is placed in the oesophagus via the mouth or nose. The device generates a low-frequency ultrasound signal, which is reflected by red blood cells travelling down the aorta. The reflected signal can be used to determine flow velocity. A validated nomogram is used to derive volumetric data such as stoke volume and cardiac output.

### Ex utero intrapartum approach to fetus (Y73.7)

Ex utero intrapartum treatment (EXIT) procedure is a specialised surgical delivery procedure used to deliver babies who have airway compression. While the surgery is undertaken on the baby, as it has technically not been born yet, the surgery must be associated with the mother.

The EXIT is an extension of a standard classical Caesarean section, where an opening is made on the midline of the anesthetized mother's abdomen and uterus. The baby is partially delivered through the opening but remains attached by its umbilical cord to the placenta, while a paediatric otolaryngologist establishes an airway so the fetus can breathe. Once the EXIT is complete, the umbilical cord is clamped then cut and the infant is fully delivered. Then the remainder of the C-section proceeds.

### Approach to hip using surgical dislocation of hip joint (Y77.1)\*

This method of approach is adopted to carry out various hip procedures and can be used in both adult and paediatric orthopaedic surgeries including, but not limited to, removal of tumours, reconstruction of femoral head, repair or reconstruction of cartilage, repair of acetabular fractures, release of impingement and labral repair or reconstruction.

To achieve this approach a cut is made through the greater trochanter (trochanteric osteotomy), the bony fragment and attached muscles are then moved to provide unrestricted access to the entire hip joint. By using this approach, the surgeon can safely dislocate the hip, thereby protecting the blood vessels around the joint and leaving essential circulation and the surrounding muscles intact. The surgeon is then able to fully visualise and correct abnormalities of bone and soft tissue about the hip joint.

Once the surgery is completed the separated greater trochanter bone fragment is reattached and securely held in place with metalwork.

### External beam radiotherapy (Y91)

Codes **Y91.1,** **Y91.2** and **Y91.4** all relate to radiotherapy using a megavoltage machine. There are two types of megavoltage machine: Colbalt-60 and linear accelerators. Whilst Cobalt-60 has its applications, linear accelerators (LINACs) have become the treatment unit of choice for many types of treatment because of their superior radiation beam characteristics. LINACs deliver a radiation dose of a specific energy, electrically generated, to a depth in the tissue which corresponds to the site of tumour, i.e. the target volume.

### Superficial or orthovoltage treatment for radiotherapy (Y91.3)

The terms superficial and orthovoltage machine may be used interchangeably. The radiation from a superficial or orthovoltage unit is referred to as x-rays, generated by bombarding a metallic target (tungsten) with high-energy electrons. This is a relatively low energy radiation source and maximum dose is deposited at the skin surface and dose falls to 90% at ~2 cm of depth in the tissue. As a result, the acute effects to the skin can be severe. Superficial or orthovoltage irradiation is primarily suited for treatment of superficial tumours that do not involve adjacent bone. Applications include primarily skin tumours and nasal cavity tumours after cytoreductive surgery.

### Megavoltage treatment for hypofractionated stereotactic radiotherapy (Y91.5)

Hypofractionated Stereotactic radiotherapy (HSRT) is a form of megavoltage external beam radiotherapy, which uses high precision techniques to deliver high doses of radiation to small targets in fewer attendances (or fractions) than for conventional radical radiotherapy.

The combination of a much higher level of complexity and the large doses of radiation result in a treatment fraction time of greater than one hour. Standard external beam radiotherapy is delivered within 15 minutes.

### Gallium-67 imaging and Radiopharmaceutical imaging (Y93 and Y94)

These refer tothe intravenous administration of substances that are radio-labelled; these are commonly called contrast media or radiocontrast agents.  They are all made up of a pharmaceutical agent, e.g. **Y94.2 Octreotide** and will also have a radioactive element. The most common types (radionuclides) are used to improve the visibility of internal body structures as an x-ray image, this is called a scintigram. Gallium-67 is commonly used to detect the presence of infections and tumours in bone, skin or soft tissues.

DaTSCAN (**Y94.1**) uses Iodine 123 to detect loss of nerve cells in the brain to distinguish between essential tremor and Parkinson disease; Octreotide uses Indium 111 to detect tumours in the brain, gut or endocrine systems; MIBG uses Iodine 123 to usually detect tumours in the adrenal gland (phaeochromocytoma) or liver.

### IVF with intracytoplasmic sperm injection (ICSI) (Y96.4)

ICSI is a means of achieving fertilisation in vitro by direct injection of a single sperm into each egg. It enables men with sperm problems to achieve fertilisation. Eggs are recovered from the woman and sperm collected from the man. Then, under a microscope, a single live sperm is selected and injected into the fluid centre (or cytoplasm) of the egg using a hollow glass needle. This carries the sperm through the protective coverings of the egg which it could not pass on its own.

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