TYPES OF REFERRED PAIN

1. Somatic to somatic

2. Pressure/trauma to nerves

3. General visceral afferent
   (Associated with autonemics)
SOMATIC TO SOMATIC REFERRED PAIN

TONSIL
Glossopharyngeal (IX) in oropharynx

TO
MIDDLE EAR
Glossopharyngeal (IX) tympanic branch

SOMATIC REFERRED PAIN
Subdiaphragmatic peritoneum (phrenic n C3,4,5) to supraclavicular ns (C3,4)
POSTEROLATERAL DISC PROLAPSE

A posterolateral disc in the L4/5 space will predominantly affect the L5 root but may also affect the S1 root and this will lead to a weak or absent ankle jerk.

REFERRED PAIN VIA THE AUTONOMIC PATHWAYS

Pain from an internal organ is usually felt in a more superficial region such as a dermatome. Travelling in General Visceral Afferents with the sympathetics the pain signals from the inflamed viscera enter the dorsal horn of the spinal cord and converge on the same neurones that are receiving sensory input from distant SOMATIC structures. The CNS cannot distinguish between the incoming signals and incorrectly assigns the visceral pain to a somatic area.

Here, for instance, the pain from the inflamed appendix is being referred to the T10 dermatome (umbilical region).
Referred pain is carried as \textit{general visceral afferents} in the sympathetic splanchnic nerves to the dermatomes as indicated by the origins of these nerves. Shown here by black arrows.

\textbf{REFERRED ABDOMINAL AND LOWER CHEST PAIN}

\textbf{LOWER CHEST}
- Dermatomes T5,6
- Oesophagus (hiatus hernia, reflux oesophagitis) or ? Heart

\textbf{EPIGASTRIC}
- Dermatomes T7-9
- Foregut - stomach and half duodenum

\textbf{RENAL/URETERIC}
- Dermatomes 9,10 (lateralised)

\textbf{UMBILICAL}
- Dermatome T10
- Midgut - 1/2 duodenum to transverse colon

\textbf{SUPRAPUBIC}
- Dermatomes T11,12
- Hindgut - descending colon, sigmoid & upper rectum

All pain is carried in \textit{“general visceral afferents”} by the splanchnic sympathetics, via the sympathetic chain to the spinal cord. It is then referred to the dermatome of that level. Note that all pain for the gastro-intestinal tract and related structures is midline because of its origin from the midline “gut tube”. Pain from the urinary tract can “lateralise” as it was formed bilaterally.
AUTONOMIC REFERRED PAIN

General visceral afferents from the heart (via sympathetics) refer pain to:
Neck
Left arm
Epigastrium

Note that the T5,6 sympathetics not only supply the heart but also the lower oesophagus and stomach so the body can confuse indigestion with coronary pain.

SUMMARY OF SYMPATHETIC DISTRIBUTION BEYOND CHAIN

- Cervical vascular
- Somatic
- Preganglionic
- Postganglionic

Diagram showing the distribution of sympathetic pathways from T1 to L2, including somatic and visceral (cardiac) pathways.
Cervical sympathetic ganglia
(All branches are postganglionic)

- Somatic branches
  - Vasomotor
  - Sudomotor
  - Pilomotor

- Visceral branches

- Vascular branches