Claims

1. A cephalomedullary nail system (100,101) comprising:

   a nail (1) comprising a proximal end (4) and a distal end (40), and having a substantially elongate cylindrical body member (45,45a), wherein the proximal end (4) further comprises a non-circular nail stem (11);

   a first locking screw (2) comprising a threaded portion (17) configured to engage with bone; and

   a second locking screw (3) comprising a threaded portion (18) configured to engage with bone;

   wherein the first locking screw (2) has a greater diameter than the second locking screw (3);

   wherein the first locking screw (2) comprises an aperture (7) configured to accommodate the second locking screw (3) within and through the structure of the first locking screw (2);

   wherein the nail (1) comprises an aperture (8) having an entry point (15) and an exit point (16) configured to accommodate the first locking screw (2) and the second locking screw (3) when the second locking screw (3) is fitted within and through the structure of the first locking screw (2); and

   wherein the first locking screw (2) further comprises one or more radiographic markings (29) configured to indicate rotational alignment of the first locking screw (2) and at least two radial notches (30) configured to indicate the correct depth of the first locking screw (2) in the nail stem (11).

2. The cephalomedullary nail system (100,101) of claim 1, wherein the non-circular nail stem (11) comprises a first end (6) located further from the distal end (40), and a second end (60) located closer to the distal end (40).

3. The cephalomedullary nail system (100,101) of claim 2, wherein the non-circular nail stem (11) is a fluted nail stem comprising a plurality of protrusions (12) extending radially outwards from an outer surface (5) thereof; and a plurality of grooves (13) formed between the protrusions (12); and wherein the protrusions (12) are optionally equally sized and spaced around the circumference of the nail stem (11), and wherein the grooves (13) have optionally a substantially square or substantially semi-circular cross-sectional shape.

4. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein the cross-sectional shape of the nail stem (11) is constant along at least a length of the nail stem (11).

5. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein at least a portion of the nail stem (11) is tapered in the direction of the first end (6) to the second end (60).

6. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein the first locking screw (2) further comprises a partial internal thread (21) which corresponds to the threaded portion (18) of the second locking screw (3); wherein the length of the threaded portion (18) of the second locking screw (3) optionally limits the depth that the second locking screw (3) can be placed within the first locking screw (2).

7. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein the threaded portions (17,18) are the leading ends of the first locking screw (2) and the second locking screw (3), respectively, that are inserted into bone; and wherein the threaded portion (17) of the first locking screw (2) is optionally shorter in length than the threaded portion (18) of the second locking screw (3).

8. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein in a first configuration the second locking screw (3) is superior to the first locking screw (2) when in use.

9. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein in a second configuration the second locking screw (3) is inferior to the first locking screw (2) when in use.

10. The cephalomedullary nail system (100,101) of Claim 8 or Claim 9, wherein the first locking screw (2) further comprises at least one radiographic marking (29), wherein when viewed on the inferior side of the first locking screw (2) indicates that the second locking screw (3) can be placed in the superior configuration; and wherein when viewed on the superior side of the first locking screw (2) indicates that the second locking screw (3) can be placed in the inferior configuration; and optionally wherein when the at least one radiographic marking (29) is visible the first locking screw (2) is in an incorrect rotation; and wherein if no radiographic markings (29) are visible, the first locking screw (2) is in a correct rotation.

11. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein the first locking screw (2) further comprises at least one radial notch (30), wherein the interaction between the at least one radial notch (30) and the entry point (15) in the non-circular nail stem (11) indicates the correct depth placement window (31) for the first locking screw (2); and optionally wherein if one radial notch (30) is visible the depth of the first locking screw (2) is acceptable; and optionally wherein if two radial notches (30) are visible the depth of the first locking screw (2) is too lateral; and optionally wherein if no radial notches (30) are visible the depth of the first locking screw (2) is too medial.

12. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein the aperture (7) has an axis offset from the axis of the first locking screw (2) by between 0° and 90°; wherein the aperture (7) optionally has an axis offset from the axis of the first locking screw (2) by between 5° and 15°; wherein the aperture (8) optionally has a longitudinal axis offset from the longitudinal axis of the nail (1) by between about 115° and about 140°; wherein the aperture (8) optionally comprises a first indentation (22) on the exit point (16), wherein the first indentation (22) is located on a proximal side (50) of the aperture (8); and wherein the aperture (8) optionally comprises a second indentation (23) on the entry point (15), wherein the second indentation (23) is located on a distal side (52) of the aperture (8).

13. The cephalomedullary nail system (100,101) of Claim 12, wherein the first indentation (22) and the second indentation (23) limit the axial movement of the first locking screw (2) and the second locking screw (3) when both are conjoined in the nail stem (11).

14.The cephalomedullary nail system (100,101) of any one of the preceding claims, further comprising a targeting arm (300) configured to engage with the first locking screw (2) and the second locking screw (3), the targeting arm (300) comprising an aiming arm (302) and a positioning element (306) having at least one hole (301a,303) adapted to accommodate placement of the second locking screw (3) within an aperture (7) in the first locking screw (2) and a hole (301b) adapted to accommodate and position the first locking screw (2).

15. The cephalomedullary nail system (100,101) of any one of the preceding claims, wherein the nail (1) further comprises a set screw (24) to hold the first locking screw (2) and the second locking screw (3) in place when inserted inside the aperture (8); and wherein the set screw (24) optionally comprises: a threaded member (24a) configured to engage with a complementary threaded portion (25) located within the bore (42); and an engaging member (26) connected to the threaded member (24a);

wherein the engaging member (26) comprises up to two wings (27) configured to engage the first locking screw (2) when inserted inside the aperture (8);

wherein when the threaded member (24a) is tightened the engaging member (26) moves in a direction towards the first locking screw (2) such that the up to two wings (27) engage the first locking screw (2); and

wherein when the threaded member (24a) is loosened the engaging member (26) moves in a direction away from the first locking screw (2) such that the up to two wings (27) disengage the first locking screw (2); and

wherein the first locking screw (2) optionally has at least one flat side (28) configured to engage the up to two wings (27).

16. A kit of parts for use in repairing a bone fracture, the kit comprising the cephalomedullary nail system (100,101) according to any one of the preceding claims.