resulting in damage to other structures. Additionally, producing the trans-sacroiliac bores, broaching, or placement of the elongate implants may result in damage to the lumbosacral neurovascular elements, as above discussed. Additionally, there may be no actual fusion of the articular portion of the sacroiliac joint which may result in continued or recurrent pain requiring additional surgery.

Another substantial problem with conventional procedures can be that placement of posterior extra-articular distracting fusion implants and bone grafts as described for example in United States Patent Application No. 10/797,481 of Stark may be inadequate with respect to removal of the articular surface or preparation of cortical bone, the implant structure and fixation of the sacroiliac joint. The method may not remove sufficient amounts of the articular surfaces or cortical surfaces of the sacroiliac joint to relieve pain in the sacroiliac joint. The implant structures described may have insufficient or avoid engagement with the articular surfaces or cortical bone of the sacroiliac joint for adequate fixation or fusion. The failure to sufficiently stabilize and fuse the sacroiliac joint with the implant structures and methods described by the Stark application may result in a failure to relieve the condition of sacroiliac joint being treated. Additionally, the method of driving apart a sacrum and ilium as described by Stark may lead to mal-alignment of the sacroiliac joint and increased pain.

The inventive sacroiliac fusion system described herein addresses the problems associated with conventional methods and apparatuses used in fixation and fusion of the sacroiliac joint.

III. DISCLOSURE OF INVENTION

Accordingly, embodiments~~a broad object~~ of the invention seek~~ean be~~ to provide an inventive sacroiliac joint implant for fixation and fusion of the sacroiliac joint. Embodiments of the sacroiliac joint implant can provide an elongate body, which can further include at least one radial member, or a pair of members which extend distance radially outward from the longitudinal axis of the elongate body adapted for non-transverse placement between the articular surfaces of the sacroiliac joint and as to certain embodiments can further provide a third radial member and additionally a fourth radial member each adapted to extend a distance radially outward from the longitudinal axis of the elongate body into the bone of the sacrum or the ilium.

EmbodimentsAnother broad object of the invention seekean be to provide an inventive method for fixation and fusion of the sacroiliac joint which utilizes the inventive sacroiliac implant. The inventive method comprising the steps of performing a minimally invasive posterior surgery that allows access to the posterior aspect of the sacroiliac joint for removing a sufficient portion of the articular cartilage or tissue between the articular surfaces of the sacroiliac joint which can be replaced by embodiments of the above described sacroiliac implant. A portion of the subcondral bone of the sacroiliac joint can be removed to provide an implant receiving space in the plane of the sacroiliac joint (non-trans-sacroiliac) configured to allow interference fitting of the elongate member, or the elongate member with at least a first radial member between the opposed surfaces of the implant receiving space. The inventive method can further include the step of providing the implant receiving space with one or more radial member receiving channels cut into the bone (including one or more of the subchondral, cortical, or cancellous) and thereby locating one or more radial members in the bone of the sacrum or the bone of the ilium. The inventive method avoids conventional trans-sacroiliac placement of fixation elements or S1 pedicle and intrailiac screws joined by a rod while providing immediate fixation of the sacroiliac joint.

EmbodimentsAnother broad object of the invention seekean be to provide one or more bone ingrowth aperture elements which communicate between the opposed surfaces of one or more radial members or through the generally linear elongate body each having a configuration which allows the bone of the sacrum and ilium to grow into or through the implant to facilitate fusion of the sacrum to the ilium and fixation of the sacroiliac joint.

EmbodimentsAnother broad object of the invention seekean be to provide particular embodiments of the inventive fixation fusion implant with an amount of curvature along the length of the implant which allows placement of embodiments of the fixation fusion implant which have an increased surface area which remain within or substantially within the articular portion of the sacroiliac joint.

According to a first aspect, there is provided a sacroiliac joint implant for implantation in a sacroiliac joint including articular surfaces of the sacroiliac joint formed by a sacrum and an ilium, the sacroiliac joint implant comprising: an elongate body including a length disposed between a first end and a second end and adapted to non-transversely locate between the articular surfaces of the sacroiliac joint to dispose the sacrum and the ilium in substantially immobilized relation; a first radial member extending along a longitudinal axis of the elongate body and adapted to non-transversely locate between the articular surfaces of the sacroiliac joint; a second radial member extending along the longitudinal axis of the elongate body and disposed in substantially opposed relation to the first radial member and adapted to non-transversely locate between the articular surfaces of the sacroiliac joint; a third radial member extending along the longitudinal axis of the elongate body and adapted to extend into the bone of the ilium, wherein the third radial member is disposed in substantially perpendicular relation to the first radial member; and a fourth radial member extending along the longitudinal axis of the elongate body and adapted to extend into the bone of the sacrum, wherein the fourth radial member is disposed in substantially opposed relation to the third radial member.

The sacroiliac joint implant may further comprise an elongate member and one or more passages extending transversely across the length of the elongate body dimensioned to allow the elongate member to pass therethrough in transverse relation to the articular surfaces.

According to a second aspect, there is provided a system for fixating a sacroiliac joint, the system comprising: an alignment tool comprising a portion, an alignment guide, and an insertion tool, the portion of the alignment tool including an end configured to mate with the first end of the sacroiliac joint implant, the alignment guide coupled to the portion of the alignment tool, and the insertion tool engaged with the alignment guide; and the sacroiliac joint implant as described above, wherein the first end of the sacroiliac joint implant is configured to mate with the end of the portion of the alignment tool, wherein the engagement of the insertion tool with the alignment guide is such that the elongate member when advanced via the insertion tool is received in the one or more passages such that the elongate member passes in transverse relation to the articular surfaces while the end of the portion of the alignment tool is mated with the first end of the sacroiliac joint implant and the sacroiliac joint implant is located in the sacroiliac joint space.

According to a third aspect, there is provided a system for fixating a sacroiliac joint, the system comprising: an elongate member; an alignment tool comprising a portion, an alignment guide, and an insertion tool, the portion of the alignment tool including an end configured to mate with the sacroiliac joint implant, the alignment guide coupled to the portion of the alignment tool, and the insertion tool engaged with the alignment guide; and the sacroiliac joint implant as described in the first aspect, wherein the sacroiliac joint implant is configured to mate with the end of the portion of the alignment tool, wherein the engagement of the insertion tool with the alignment guide is such that the elongate member when advanced via the insertion tool is caused to pass in transverse relation to the sacroiliac joint and the elongate body of the sacroiliac joint implant while the end of the portion of the alignment tool is mated with the sacroiliac joint implant and the sacroiliac joint implant is located in the sacroiliac joint.

According to a fourth aspect, there is provided a system for fixating a sacroiliac joint, the system comprising: a sacroiliac joint implant for implantation in the sacroiliac joint, the sacroiliac joint implant comprising an elongate body including a first end, a second end and a length disposed between the first end and the second end, the elongate body being adapted to non-transversely locate within the sacroiliac joint; a coupling element configured to connect to the sacroiliac joint implant; a spanning member securable to the coupling element; and a second coupling element engageable with the spanning member.

According to a fifth aspect, there is provided a system for fixating a sacroiliac joint, the system comprising: a sacroiliac joint implant comprising an elongate body including a first end, a second end and a length disposed between the first end and the second end, the elongate body being adapted to non-transversely locate in the sacroiliac joint to substantially immobilize the sacroiliac joint; an elongate member; and an alignment tool comprising a portion, an alignment guide, and an insertion tool, the portion of the alignment tool including an end configured to mate with the sacroiliac joint implant, the alignment guide coupled to the portion of the alignment tool, and the insertion tool engaged with the alignment guide, wherein the engagement of the insertion tool with the alignment guide is such that the elongate member when advanced via the insertion tool is caused to pass in transverse relation to the sacroiliac joint and the elongate body of the sacroiliac joint implant while the end of the portion of the alignment tool is mated with the sacroiliac joint implant and the sacroiliac joint implant is located in the sacroiliac joint.

According to a sixth aspect, there is provided a sacroiliac joint implant for implantation in a sacroiliac joint including articular surfaces of the sacroiliac joint formed by a sacrum and an ilium, the sacroiliac joint implant comprising: an elongate body including a length disposed between a first end and a second end and adapted to non-transversely locate between the articular surfaces of the sacroiliac joint to dispose the sacrum and the ilium in substantially immobilized relation; a first radial member extending along a longitudinal axis of the elongate body; a second radial member extending along the longitudinal axis of the elongate body and disposed in substantially opposed relation to the first radial member; and an end cap supported on the first end of the elongated body and extending along the first radial member and the second radial member.

Naturally, further ~~objects~~ embodiments of the invention are disclosed throughout other areas of the specification, drawings, photographs, and claims.

IV. BRIEF DESCRIPTION OF THE DRAWINGS