‘It’s *all* connected, so it *all* matters’ - the fallacy of osteopathic anatomical possibilism

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Abstract
Anatomy has been a cornerstone of osteopathic theory, practice and identity from the discipline’s emergence in the 1800s and continues to be viewed as core knowledge to the present day. The domain of anatomical knowledge has provided seemingly endless rationales and explanations to justify osteopathic diagnosis, assessment and treatment. Moreover, It has been foundational for osteopaths’ professional identity and conception of healthcare practice. Anatomical possibilism refers to the imagined, exaggerated, implausible and unproven relationships which are claimed to exist between anatomical structures. In persisting with such an approach to theory, practice and reasoning osteopathy may waste time, energy and intellectual capital and as a result fail to take advantage of opportunities to develop more plausible, ethical and person-focused approaches to patient care.

Keywords: Osteopathic Medicine, Anatomy, Manual Therapy

Implications:
1- Anatomical knowledge has been central to osteopathic theory, practice and identity since its conception.

2- Anatomical possibilism refers to the imagined, exaggerated or implausible relationships which are claimed to exist between anatomical structures.

3- Anatomic possibilism may be used to construct elaborate osteopathic diagnostic explanations and frameworks for clinical assessment and treatment

4- Anatomical possibilism may lead to the osteopathic profession wasting time, energy and intellectual capital and as a result fail to take advantage of opportunities to develop more plausible, ethical and person-focused approaches to patient care.

Introduction: Anatomy - the beating heart of osteopathy?

As with many other healthcare disciplines, osteopathy has taken a particular journey into being (Baer 1987; Pettman 2007), has its own set of underpinning philosophical principles (Cotton 2013) and its own historiography (O'Brien 2015). It appears that some osteopaths' embody osteopathy's core principles and premises and apply these historical concepts to their current clinical work (Kasiri-Martino and Bright 2016) as well as serving to provide a strong sense of professional osteopathic identity (Phillips 2022; O. P. Thomson, Petty, and Moore 2014; Skinner, Esber, and Walkowski 2022). Many of osteopathy's traditional principles and philosophies arose from anatomical observations and subsequent inferences regarding the significance of anatomy for health, disease and treatment (Still 1908), and some recent evidence indicates that osteopaths continue to consider anatomical knowledge to be particularly important for osteopathic practice (Blaich et al. 2019). In response to recent calls to critically consider osteopathy's direction and possible futures (Vogel 2021), this paper critically examines the foundational role that anatomy has played in osteopathy's initial emergence and argue that a continued promotion and reliance on 'anatomical overreach' is inherently problematic in the professions aspiration of contemporary person-focused healthcare practice. Specifically, we propose that osteopaths' guiding anatomical premise that 'it is *all* connected, so it *all* matters', which we term 'Anatomical Possibilism' (AP) (Tovar, 2021), is not only fallacious but may inhibit the delivery of effective and ethical care. As we have argued previously (Oliver P. Thomson and MacMillan 2023), we believe there's much space and opportunity for osteopathy to stake a valuable role in healthcare in more contemporary, effective and collaborative ways, but rigid application of historical concepts and tenets may present a barrier to osteopathy's future development.

The authors of this commentary are experienced, practising osteopaths in a range of settings and jurisdictions. With a combined clinical experience of 25 years, the authors have brought their perspectives as clinicians (osteopathy and physiotherapy), educators (osteopathic clinical tutoring, lecturing osteopathic technique and theory), and researchers (backgrounds in osteopathic clinical reasoning, education and sociology). As with all position papers such as this, it is not intended to be comprehensive nor is our view on this topic the definitive one; but we hope that the paper will encourage critical reflection amongst clinicians, educators and students of osteopathy. Finally, it is likely that AP (or something similar to it) is present in other MSK disciplines, however this paper focuses on how the concept relates to osteopathy.

Anatomical possibilism

We argue that anatomical possibilism is an approach to clinical thinking that *prioritises* knowledge of anatomy to construct narratives and justify therapeutic approaches which goes beyond the need for clinicians to have a firm grounding in anatomy and physiology to guide safe healthcare practice. When a clinician engages in AP, they focus on creating tenuous structural-functional connections as explanatory frameworks to justify the need for treatment, which we will discuss within this paper. At the centre of AP is the desire to find clinical meaning and utility in the relationships between different anatomical regions, systems and tissues - a form of 'anatomical holism'. However, viewing patients in this manner, where the 'body as machine' is foregrounded over phenomenologically-oriented perspectives is consistent with the biomedical model (Marcum 2004). AP refers to the imagined, exaggerated and explanatory relationships which are claimed to exist between anatomical structures

and their subsequent aetiological and therapeutic significance, especially in regards to manual palpation and treatment. Such AP is misguided not only due the lack of validity and plausibility of its assumptions and inferences (Thomson and Martini, 2024), but it also represents potential harm to patients by emphasising nocebo and other undesired effects which may negatively impact a person's illness and recovery (Hohenschurz-Schmidt et al. 2022)**.**

The idea that the body needs to be in perfect form and alignment, or that such a state exists, can be considered anatomical normativism or akin to what Aquino (Aquino 2022) describes as 'pathologising ugliness' whereby medical language and processes nurture the claim that undesirable, imperfect or different physical features are 'abnormal' or 'pathological' and require healthcare intervention, these concepts have been recently discussed at length in an osteopathic context (MacMillan 2021; Maretic and MacMillan 2022). Beliefs such as these clash with the reality that asymmetry (Christensen and Hartvigsen 2008; Knutson 2005) a range of spinal postures (Damasceno et al. 2018; Barrett et al. 2016; Grob, Frauenfelder, and Mannion 2007; Andias and Silva 2019) and variation of anatomical structures (Herrington 2011; Preece et al. 2008) are common findings in asymptomatic people. Moreover, clear deviations from the 'normal' observed in radiological examination are inconsistently associated with neck (Farrell et al. 2019) and back pain (Hopayian, Raslan, and Soliman 2023; Brinjikji et al. 2015; Kasch et al. 2022; Tonosu et al. 2017). As such, if the current gold standard methods (i.e. MRI) to assess and measure structural and anatomical changes have limited reliability and utility in regards to predicting pain and disability, then osteopaths are encouraged to continue to reflect on osteopathy's central premises. Such tenants emphasise not just the importance of anatomical features of people's bodily structure, but also the claimed 'anatomical butterfly effect', where seemingly insignificant deviations and differences in anatomical structure and function have far reaching implications and consequences for the health and suffering of patients - which we argue is the case of anatomical possibilism.The implication of AP in this regard is that clinicians beliefs and communication has the power to impact patients beliefs, actions, pain and prognosis (Setchell et al. 2017; Mescouto et al. 2022; Kirby et al. 2023) .

Notions akin to AP have long been used to make sense of clinical presentations in other therapeutic practices, such as physiotherapy (Pynt, Jenny, Dale Larsen, David Nicholls, and Joy Higgs 2017; Nicholls and Gibson 2010; Nicholls 2017). The knowledge gaps that existed at the time of osteopathic inception, and may persist today, required osteopaths to make decisions in the absence of a clear path. When faced with clinical uncertainty, AP is alluring as it may provide a rationale for diagnosis and treatment, 'my patient has altered posture and pain, therefore the phenomena are interrelated' the simplicity and face validity of this approach may be the genesis for this clinical reasoning approach. The certainty of AP has been used to fill the unknown, giving a physical explanation to phenomenological entities seen in practice. A clear structural diagnosis is favoured by patients (Lim et al. 2019) and clinicians (Pathirana, Clark, and Moynihan 2017), as clinical uncertainty is often unsettling and difficult to navigate (Costa et al. 2022).These explanations may not accurately reflect the complexity inherent in a clinical encounter nor adequately account for the trajectory of symptoms or therapeutic effect seen when they are addressed (Sherriff et al. 2022). However, terms which more accurately reflect our current understanding of the pathological/pathoanatomical process, such as 'non specific pain syndromes', may engender similar uncertainty, or in fact create an impression that the clinician has not been able to discern a clear cause, and therefore treatment, due to a skill gap rather than the inherent uncertainty of the biological reality, losing credibility and distorting therapeutic alliance (Lim 2019). Therefore incorrect, inaccurate but plausible certainty is appealing to clinicians and patients. Given that a large proportion of MSK conditions improve with natural history (Vasseljen et al. 2013) and the therapeutic benefits of contextual factors (Cashin et al. 2021) patients will likely improve following these implausible interventions, reinforcing the belief in them by the clinician 'it works in my practice' and the patient 'it works for me', demonstrating a post hoc fallacy (Hartman 2009).

As a consequence of this uncertainty or lack of consistency within osteopathy, many diagnostic labels emerged to describe what is wrong: somatic dysfunctions were followed by sacral torsions, first rib dysfunctions, restricted cranial suture's movement, rotated organs and many other diagnoses that kept up with the zeitgeist of the 19th century (Chila 2010). These terms and its narratives have contributed to reinforce the 'body as a machine' construct that has been pervasive in healthcare (Descartes 2000), shaping how humans face illness and what they expect from clinicians. AP has the potential to reduce patients to passive recipients of care, dependent on a knowledgeable clinician for 'treatment' of these maladies (Oliver P. Thomson and MacMillan 2023). The following section illustrates how AP may have influenced, and continue to shape parts of, the sub-disciplines of structural, cranial and visceral osteopathy.

Structural, cranial and visceral (im)possibilisms

One of the foundational assumptions of osteopathy is the primacy that anatomy has in the development of and recovery from pain/illness (Paulus 2013). A core premise of osteopathy has been the role of anatomical relationships (i.e. locality, connectedness and function) of bodily structures, organs and tissues (Stark 2013). AP has played a central role in the construction of conceptual frameworks and theories to explain a persons' symptoms and clinical presentations and to justify and guide subsequent therapeutic action. Evidence suggests that anatomy continues to be a primary currency of knowledge in osteopathic practice (Alvarez et al. 2020; van Dun et al. 2022; Santiago et al. 2022) and education (MacMillan et al. 2023) an it is worth noting that European standards for osteopathic education and practice advocate for the 'five models' of osteopathy, four which can be considered to have a strong anatomical basis (eg respiratory, structural, bioenergetic, neurological models) ("Osteopathic Standards – EFFO" n.d.). In our view, AP has been fundamental for the main categories or sub-disciplines of osteopathy, colloquially coined 'structural', 'cranial' and 'visceral' osteopathic approaches. Before discussing each in turn, it is worth noting that a common anatomical possibilist idea that is shared by these three sub-disciplines is the claimed importance of fascia, whose negative effects when 'dysfunctional' can seemingly impact everything everywhere - every system, organ and structure in the body no matter how macro, micro or remote (Swanson 2013; Tozzi 2012; Bordoni and Zanier 2015).

'Structural osteopathy' is based on the assumption that the body's physical structure, anatomy, , deviations from normal and associated 'somatic dysfunctions' are primary causes of pain and disease and are amenable to manual osteopathic manipulative therapy (OMT) (Giusti 2017). Although attitudes vary globally, somatic dysfunction (SD) is considered a central concept for this theory and way of practising osteopathy (Tramontano et al. 2021) and is valued by osteopaths as an important clinical tool (Arcuri et al. 2022). SD represents a clinical entity, diagnosed exclusively by osteopaths, that impacts pain, function, and general health, and is appropriately treated using OMT (Tramontano et al. 2021). It has been suggested that SD can occur in asymptomatic individuals (Vismara et al. 2024), and some suggest that the presence SD can create biomechanical and neurological consequences which predispose the individual to future pain and other health complaints (Wurster 2010). However, high quality evidence is not available to empirically verify this claim and research Exploring somatic dysfunction suggests it is an elusive, if not imaginary, entity (Fryer 2016; Noy, Macedo, and Carlesso 2020).

In respect to cranial osteopathy or osteopathy in the cranial field (OCF), AP was behind the 'Thinking Fingers' of the original developer of OCF: William Sutherland (Sutherland 1962). Sutherland proposed that the sutures of the skull resembled the gills of a fish. He went further by assuming that there was an inherited primary respiratory movement that, if altered, could become a serious health problem. He knew his hypothesis was implausible, yet he was convinced by his thoughts and circumstances (Sutherland 1962). These notions have been built upon and subsequently developed and may include more esoteric examples of AP, akin to energetic healing, such as the involuntary mechanism and various 'tides' or palpable rhythmic motions within the body not explained by cardio-respiratory

systems, for a comprehensive history of OCF see (McPartland and Skinner 2005; Jordan 2009; Zweedijk and Oosten 2021; Masiello 2022). Implausible and unproven anatomical claims and connections associated with cranial osteopathy include the minuscule (even nanoscopic (Bordoni and Escher 2023)) ‘rhythmic motion’ of the osseous and membranous movements of the skull and it’s contents that can be reliably manually determined through palpation and have meaningful impacts on other regions of a person's body and subsequent health, see Ferguson (2003) for a summary of such claims (Ferguson 2003). Evidence in the form of systematic reviews are yet to support either the specific claims related to the existence or manual assesment‘primary respiratory motion or other claimed phenomena of OCF (Guillaud et al. 2016) or claimed clinical effectiveness (Jäkel and von Hauenschild 2011; Ernst 2012).

During their initiatives to develop the field of visceral osteopathy, practitioners have suggested some of the most exquisite examples of AP such as: osteopathic palpation of the heart - including movement of the entire heart (such as ‘uncoiling’, ‘widening’, ‘twisting’, ‘shortening’, ‘narrowing’, and ‘lengthening’ of the heart) and palpation of the ‘systolic memory’ imprinted in the pericardial fascia (Bordoni and Escher 2021), Chapman points (somatic/cutaneous manifestations of visceral dysfunction) (Chila 2010), the pericardial-pelvic relationship (Bordoni 2020) and the claimed relationship between biomechanics of the pelvic region and urinary tract infection (Stone 1996). Many of the purported mechanisms require mechanistic leaps of faith; relying on tenuous anatomical continuity grounded in the claim that ‘the body is a unit’. Such connections are used to justify treatment, including manual release of the diaphragm (Bordoni et al. 2016), pressing against the eyeball to mobilise the optic nerve to influence the dura mater (J. P. Barral and Croibier 2009) or the use of quantum physics to palpate the meninges (Bordoni, Morabito, and Simonelli 2019). Within the visceral osteopathic realm, AP has also been used to claim relationships between the structure and the psychology of patients: from considering the organs have a memory “the liver memorises every element that goes into building our identity: emotions, pitfalls, death of loved ones, misadventures, illnesses” (J.-P. Barral and O. 2007) (.p104), those with gallbladder issues “usually worry about unimportant matters" (J.-P. Barral and O. 2007)(p86) and the spleen and pancreas “react to deaths that have not been accepted” (35. p138). Needless to say, current best research evidence in the form of systematic review is unable to support either the diagnostic or effectiveness claims of visceral osteopathy (Guillaud et al. 2018).

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Anatomical possibilism - the beginning and the end of osteopathy?

We wish to emphasise that anatomical knowledge *is* required for safe and effective osteopathic practice, in accordance with established competency frameworks for primary care musculoskeletal practice such as those outline in the UK NHS Advanced Clinical Practice Frameworks for ‘first point of contact practitioners’; a role which osteopaths either currently practise or aspire to fulfil (“Musculoskeletal (MSK) First Contact Practitioners” 2019) and anatomical knowledge is considered essential for undergraduate physiotherapy education in the UK (Gangata et al. 2021). Hence, we are not implying that anatomy is not valuable knowledge for osteopaths; osteopaths need to know a foot is a foot and not an elbow, the location of peripheral nerves and the chambers of the heart. However, AP involves stretching or in some cases creating and imagining anatomical connections to explain a person’s complex illness, pain and subsequent treatment. Such a mode of thinking is analogous to a ‘God of the gaps’ reasoning (Dixon 2008) where anatomy, instead of God, is used to plug the gaps in evidence and navigate clinical uncertainty and complexity. Such implausible claims, without robust evidence, risk providing ineffective care while also undermining the credibility of osteopathy and its claim as a healthcare profession (Thomson and Martini, 2023). In persisting with implausible, unevidenced and, in some cases, unethical stances to theory, practice and reasoning osteopathy may perpetuate models of practice that not only confer little benefit to patients, but where there is a

potential for harm and risks being designated as low-value care (Hartvigsen, Kamper, and French 2022) and miss opportunities to work to enhance the health of society in broader healthcare systems.

This commentary has aimed to articulate and demarcate the concept of anatomical possibilism, where it forms part of osteopathic theory and practice, and its unhelpfulness to people and professionals/professions. We do not pretend nor is it the scope of this paper to provide an alternative model, but it has aimed to signpost resources for osteopaths to reflect on their own tendency for AP. There remains a significant challenge for osteopathy to move away from traditional anatomy-centred frameworks and practices towards more person-centred care. This transition is made more challenging by educational institutions, professional organisations and individual osteopaths desire to maintain traditional practice, theory and identity which is founded on AP and saturated with knowledge, theory and subsequent clinical action. It remains to be determined what osteopathy should place at its 'heart' - we would argue it is the care of people (patients); including their values, lived-experiences, autonomy and their social relations which contribute to their personhood (Gibson 2016) and should inform a (re)consideration of the nature and purpose of modern day osteopathy.

Conclusion

Anatomical knowledge is needed in some form or another for safe and effective osteopathic practice. However, a misguided use of anatomical knowledge in the form of anatomical possibilism is deeply embedded within osteopathic history, practice and education and moving away from a reliance on such ideas will be an immense challenge for the profession. Anatomical possibilism is not only fallacious but prevents the promotion, communication and delivery of person-centred and ethical care. Ongoing critical reflection on all areas of professional practices, including the assumptions and values relating to anatomical knowledge, should be encouraged and the range of possible futures for osteopathy should be considered in light of best evidence, best practice and societal needs.

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